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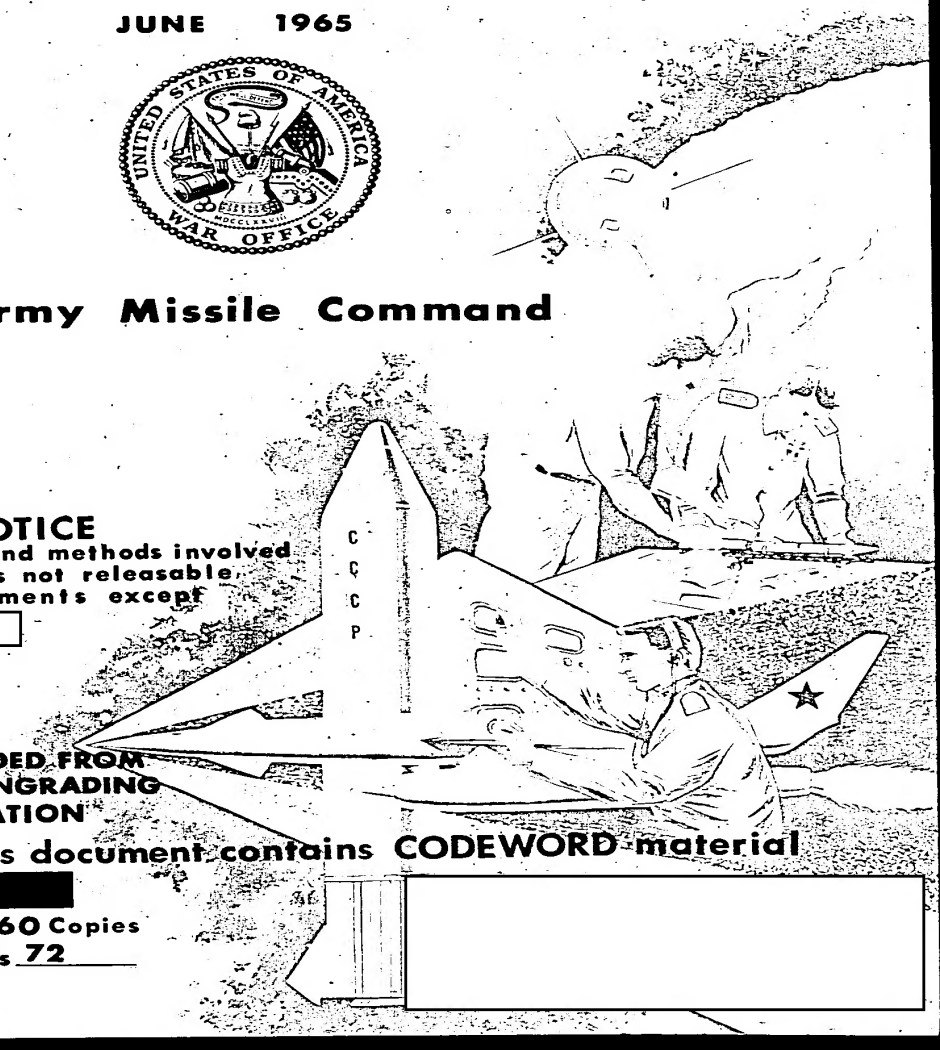
SINO - SOVIET BLOC MISSILE AND SPACE TECHNOLOGY

JUNE 1965

Army Missile Command



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MK 2-65
JUNE 1965

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FOREWORD

MK 2-65 is the latest in a series of quarterly reports on developments at Sino-Soviet missile facilities that are based on the latest photographic analysis combined with other available intelligence information.

This report, utilizing information that was compiled up to 30 June 1965, was prepared by the Directorate of Missile Intelligence of the U. S. Army Missile Command, Redstone Arsenal, Alabama with support from the U. S. Army Photographic Interpretation Center, Washington, D. C., and the National Photographic Interpretation Center, Washington, D. C.

Comments or queries relating to this report should be submitted to the Commanding General, U. S. Army Missile Command, ATTN: AMSMI-Y, Redstone Arsenal, Alabama.

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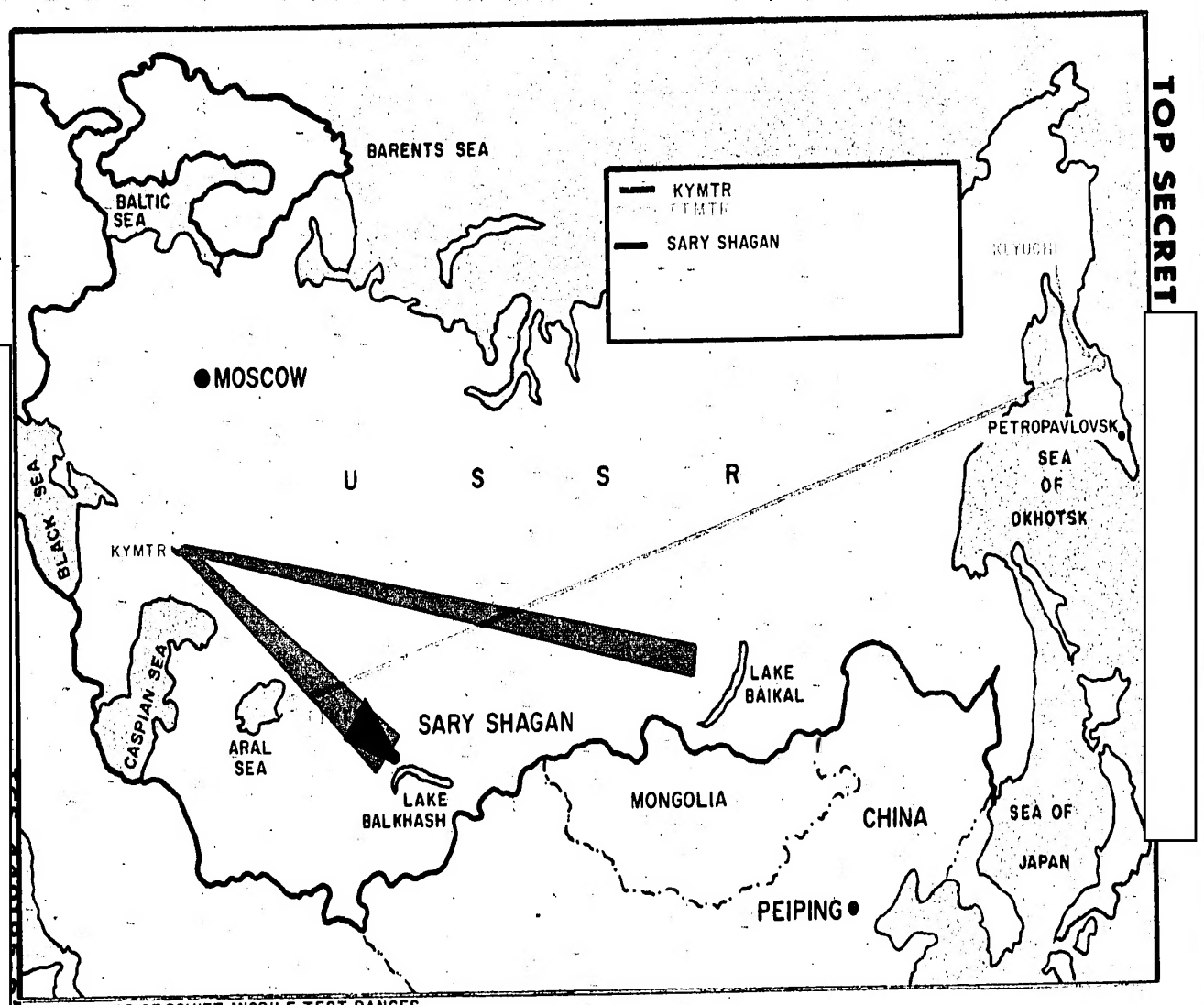

FIGURE 1. MAP OF SOVIET MISSILE TEST RANGES

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I. SUMMARY

Construction of the Sary Shagan Antimissile Test Center (SSATC) was first indicated in the 1956-1957 time frame. The instrumentation ring, designed and positioned specifically for observation of anti-missile missile launchings and incoming vehicle re-entry flight paths, was essentially complete by 1960. Construction and alterations, as well as an extension of range instrumentation, are continuing, but the basic purpose of the range has not been altered by this activity.

It is believed that the evidence does not indicate basic SAM developmental activities at the SSATC. In fact, there is ample evidence to substantiate a separate Soviet R&D program to develop an antitactical ballistic missile system (ATBM), including the Sary Shagan timing signal intercepts, a portion of which can be broken out as a strong indication of ATBM system tests. This separate and distinct program is also supported by the continuing activities noted at Sites 1 and 2, Complex A, in photography, the identification of SA-2-type equipments, the position layout of Instrumentation Sites 11 and 12, the grouping of identifiable impact craters, and the identifiable program involving the D04 group in 1961.

Photographic coverage of the Tyuratam Missile Test Range (TTMTR), [redacted] provided evidence of continuing construction in that area. The most significant new facilities include a possible new launch facility (A4) at Complex A, another launch pad (J2) at Complex J in the initial stage of construction and the L-group of launchers that has been expanded to 10 launch silos. The possible new launch pad (A4) is approximately 400' east of A2 and appears to be a rectangular, rail-served concrete pad.

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Coverage of the Kapustin Yar Missile Test Range (KYMTR) on [redacted] revealed several missile exercises in that area but not any major new developments.

Several vehicles were identified around the Northern Ramp in Launch Area A which is believed to be a naval-related facility. Several missile-like objects were noted in the support area of Launch Complex B, but none could be identified as to specific type. Launch Area 1-C, consisting of two rail-served launch pads, is now complete and usable; the old launch pad in this area has apparently been abandoned. This area could be related to an expansion in the COSMOS satellite program. In Launch Area 2-C an SS-4 training exercise was underway at the south pad and modifications were being made to the north pad. An SS-5 training exercise, probably a dry fire exercise, was underway at the north pad in area 5C-1; Launch Area 5C-2 is apparently abandoned. Launch Complex H, which is still under construction, should be completed in a few weeks; the launch pads in this area are only about 435' apart, which suggests that a small

weapon will be fired from this area when completed. Limited training activity in the Tactical Rocket Forces Training Area involved three SCUD units, two in the area behind Launch Complex E and one near the barracks area at Launch Complex A.

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area and Support Area A. The launch area was active and contained objects in the center of each launch pad. Judging from their size and configuration, these objects could have been missile transporter-erector-launchers. The test range continues to be used in missile testing, but no specific system involved in this testing can be identified.

In China a two-pad coastal defense cruise missile launch complex was discovered near Yen-t'ai on the Shan-tung Peninsula, and five more SA-2-type SAM sites were identified - two at Lanchow, one at Pao-t'ou and two at the Shuang-ch'eng-tzu Missile Test Center (SCTMTC) rangehead. A probable missile exercise was underway at the south pad of SSM Launch Complex A on [redacted] and at least 10 vehicles or pieces of equipment were parked at the motor pool of the SSM/SAM Assembly and Checkout Area on [redacted]. This activity tends to confirm the probability that SAM operations at rangehead are moving into a more active phase.

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II. DEFENSIVE MISSILE SYSTEMS

A. Antimissile Missile Systems

1. Current Assessment of Sary Shagan Antimissile Test Center (SSATC) Development

a. AMM Programs

(1) Construction of the Sary Shagan Antimissile Test Center (SSATC) was first indicated in the 1956-1957 time frame. The instrumentation ring was essentially complete by 1960 and was designed and positioned specifically for observation of antimissile missile launchings and incoming vehicle re-entry flight paths. The difference in basic missions of the Sary Shagan range and the surface-to-air missile range at Kapustin Yar is clearly evident by comparing the layouts in Figures 2 and 3.

(2) Construction and alterations, as well as an extension of range instrumentation, are continuing at the SSATC; this type of construction activity is normal and expected as individual program requirements change. The basic range purpose has not been altered by any construction or modifications, but an extension toward the rangehead along the trajectory line was evident in [redacted] with the initiation of construction of instrumentation sites 14 through 17. Developments on the overall range and in the program indicate that 1962 was a critical year. Considering other significant construction starts such as the Triads in 1961, the termination of GRIFFON testing from Sites 5 and 6 and the range extension, it would appear that an entirely new phase of development activities was intended and planned for as early as 1961.

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(3) It is believed that the evidence does not indicate basic SAM developmental activities at the SSATC. Kapustin Yar is well established as the Soviet SAM R&D testing range. In addition, the Emba range is suspected to be a tactical missile range and could support some tactical SAM function, as suggested by the tentative identification of GANEF at one of the launch sites. It would be misleading to conclude that the SAM program does not benefit directly from SSATC antimissile developments, but it is felt that application of these developments would be at the primary SAM ranges and not at the SSATC.

(4) There is ample evidence to substantiate a separate Soviet R&D program to develop an antitactical ballistic missile system (ATBM), including Sary Shagan timing signal intercepts, a portion of which can be broken out as a strong indication of ATBM systems tests. This separate and distinct program development is also supported by the continuing activities noted at Sites 1 and 2. Complex A, in photography, the identification of SA-2-type equipments (missiles and launchers), the position layout of Instrumentation Sites 11 and 12, the grouping of identifiable impact craters and the identifiable program involving the D04 Group in 1961

(5) Photography substantiates a general facility shutdown (excepting Electronic Site C) of Sites 5 and 6, Complex A, and a termination of AMM tests from these sites. The Soviet decision not to deploy the GRIFFON

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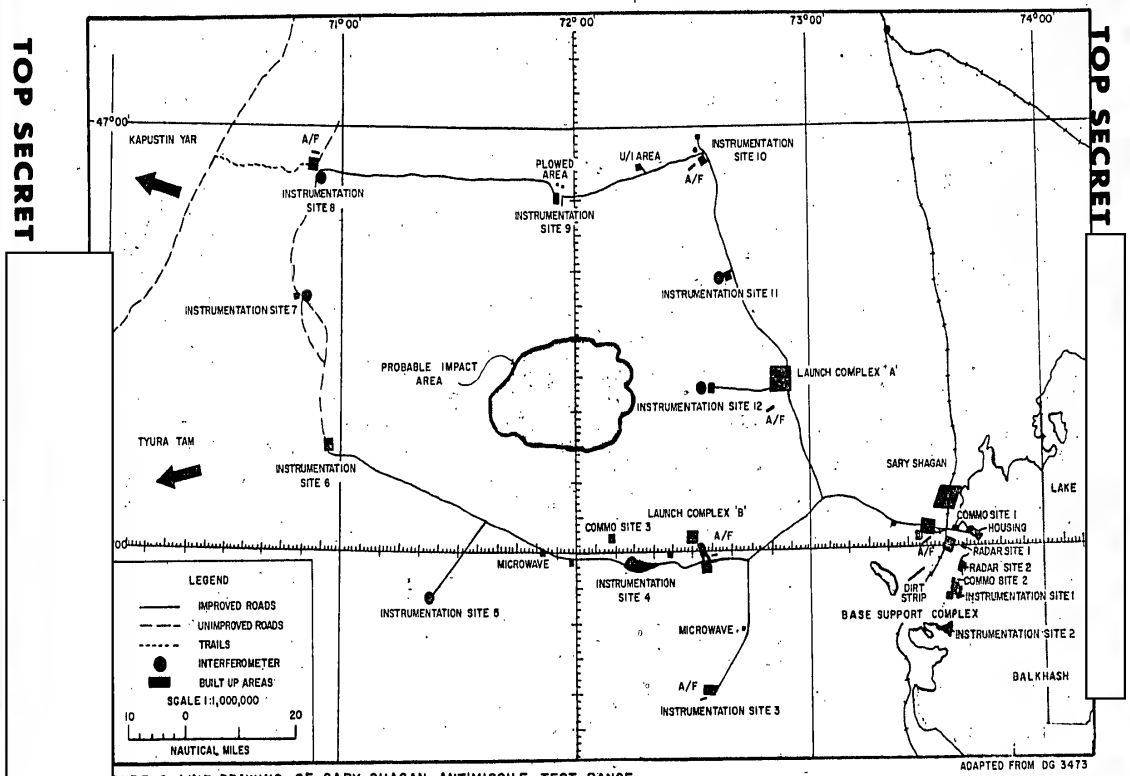

GURE 2. LINE DRAWING OF SARY SHAGAN ANTIMISSILE TEST RANGE

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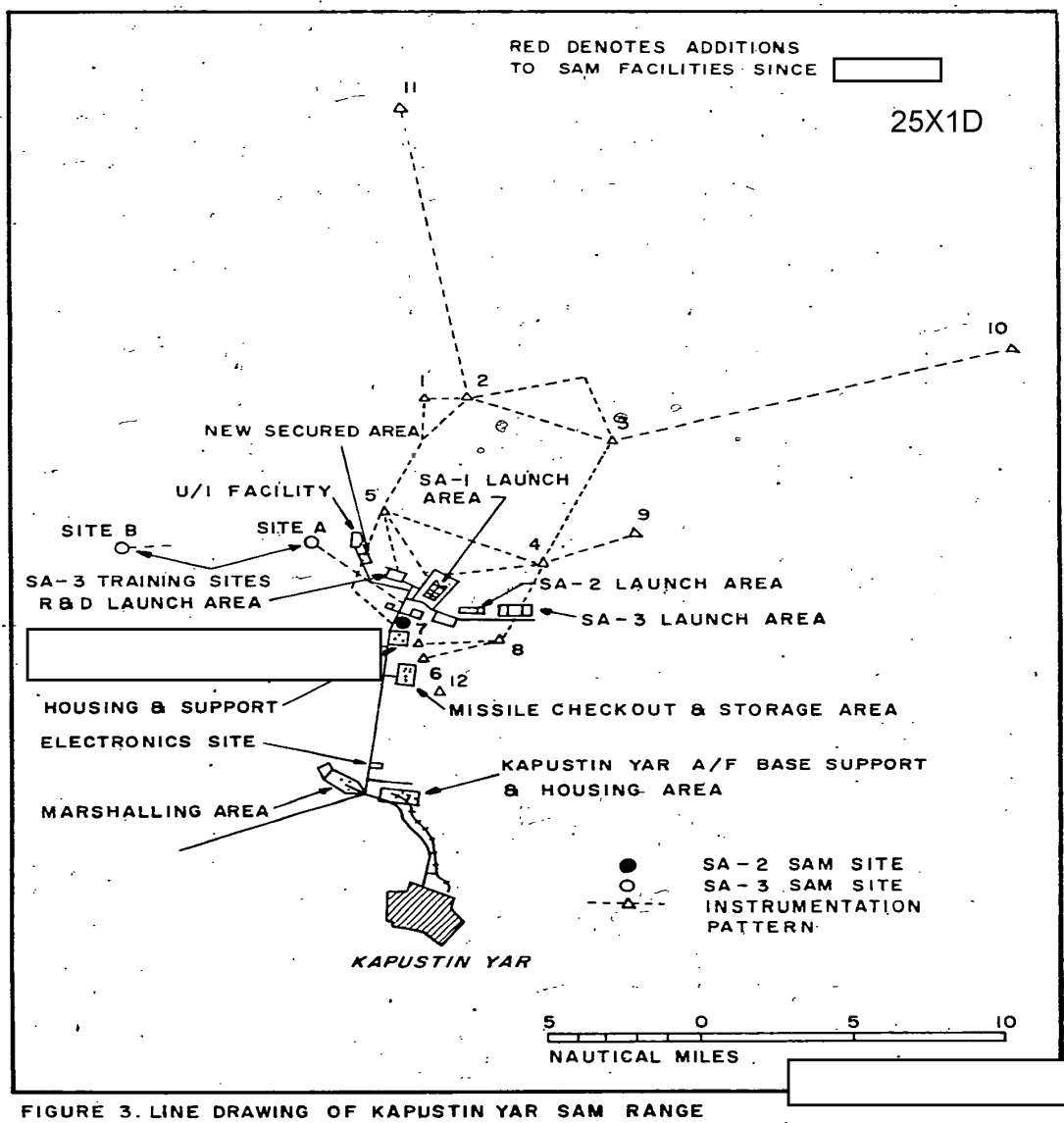

FIGURE 3. LINE DRAWING OF KAPUSTIN YAR SAM RANGE

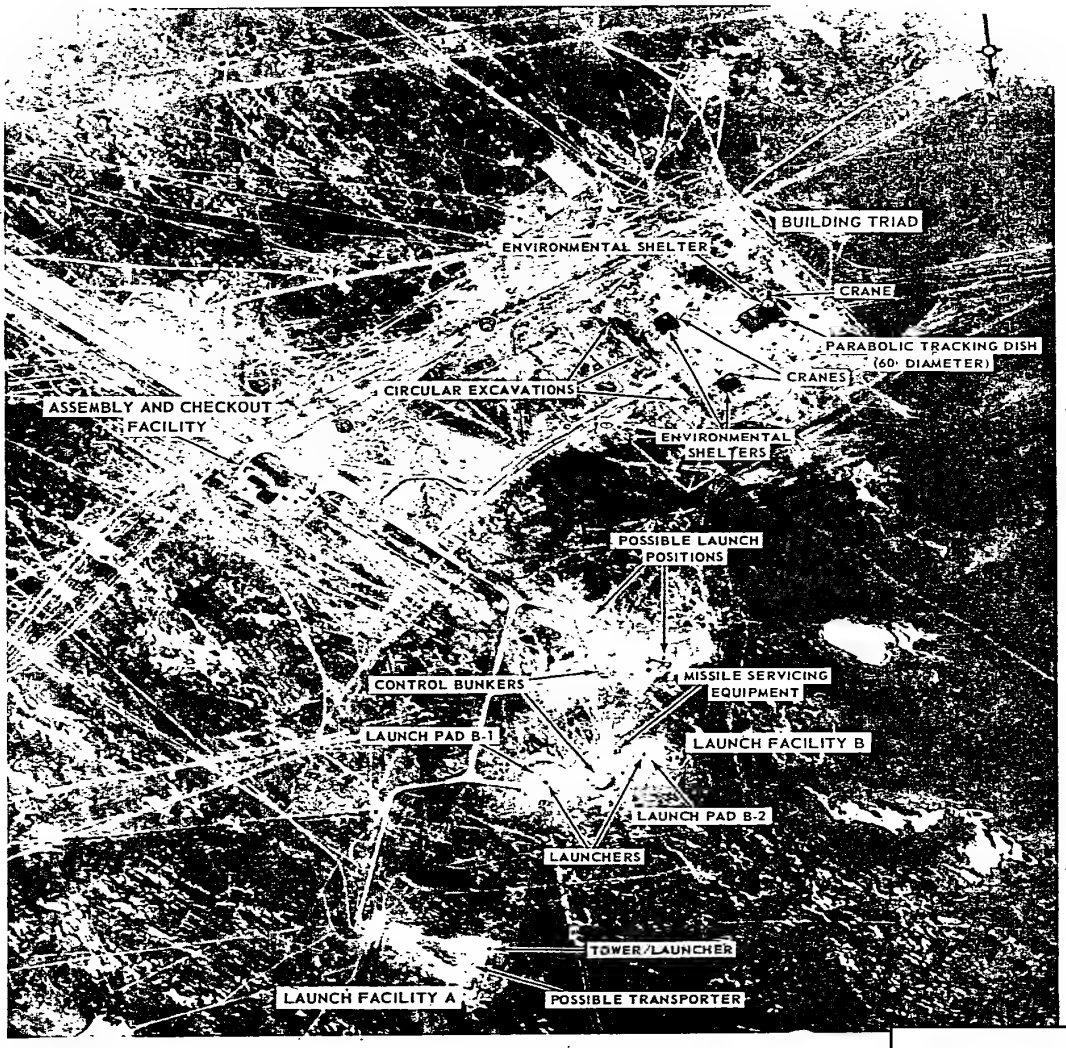

FIGURE 4. LAUNCH COMPLEX B, SARY SHAGAN ANTIMISSILE TEST CENTER(SSAIC)

missile system, which underwent R&D at these sites, is clearly evident by the construction changes to the Leningrad complexes where construction changes that are similar to Launch Sites 3 and 4 are being made. Analysis of the observed R&D testing program clearly indicates a continued program involving the launching of target missiles to ranges around 500 and 800 nm. The length of the launcher rails on several of the launch positions at Sites 3 and 4 (excluding pads 5 and 6 of Site 3) indicates that the intercept missile is shorter than GALOSH. The electronics associated with Launch Sites 3 and 4 are not indicative of an AICBM system if these radars are the only ones used with the missiles fired from Sites 3 and 4. However, if the GALOSH is fired from pad 5, Launch Site 3, and the radars are connected with other radars such as HEN HOUSE and the Triads, it is possible that two different missile systems are under development at Sites 3 and 4. Since it is possible that GALOSH is launched from the revetted launch position at Site 3, the development of an area defense weapon system would explain the indicated systems deployments at Tallinn, Cherepovets and Leningrad. If only the ranges of target missiles are considered, the tentative conclusion would be that the programs involving Launch Sites 3 and 4 and the indicated deployments are for an anti-MRBM system. The final determination depends on whether GALOSH will be deployed at Tallinn and Cherepovets.

(6) A third alternative that may explain the SSATC activities and developments is that the Soviets have been successful in developing an effective SAM system as a result of the AMM system program and are intending to deploy it in this role at Tallinn, Cherepovets and Leningrad.

b. Launch Facilities 25X1D

Since the initial identification in [redacted] of launch facilities at the SSATC, consisting of two major areas - Complexes A and B, a considerable expansion has been observed in the launch areas. Little activity has been detected in the last year or two at some launch positions whereas other positions have been extremely active. When first observed, Complex B consisted of three launch positions, designated areas A, B1 and B2. At the same time Complex A consisted of four sites - two SA-2-type sites in the southern portion, designated Sites 1 and 2, and two in the northern portion, designated Sites 5 and 6. The following paragraphs describe the changes that have occurred in each complex since [redacted] 25X1D and the activities at each site.

(1) Complex B

When first observed in [redacted] Complex B (Figure 4) appeared complete and vehicular activity was noted in the launch areas. Cloud cover and obliquity of photography hampered analysis, but all facilities were observed to some extent. Site A of Complex B was separately fenced and consisted of a large, generally rectangular prepared pad with a launcher centered in the western half of the prepared area; it appeared complete and no significant change in facilities has been seen to date. Sites B1 and B2 were prepared semicircular pads with a launcher located at the center of the straight side of each site. Site B1 has an excavation surrounding the launcher 25X1D

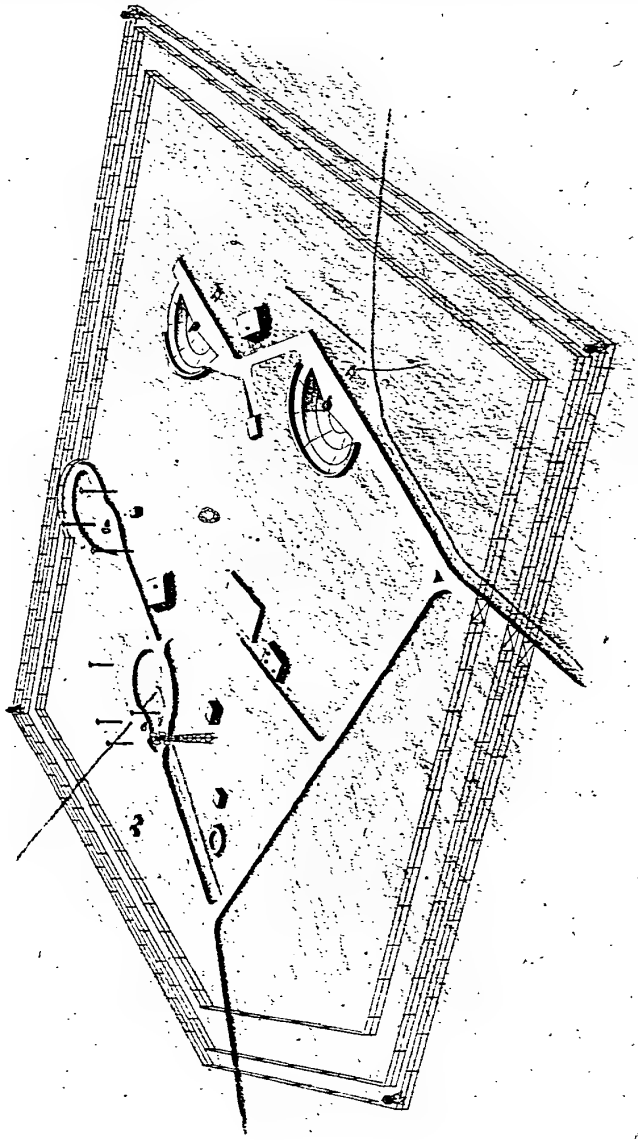

FIGURE 5. CONCEPT OF ADDITIONAL LAUNCH POSITIONS AT COMPLEX B, SSATC

and Site B2 is almost flat. A bunkered probable control position is located between the two launch sites and the area is road-served as is Site A. Several instrumentation sites surround the launch area and were connected by cable to the launch sites. A completed missile storage and checkout facility was observed in [redacted] on the main road leading from the support area to the launch sites. Little, if any, change has been observed in any of the above facilities since [redacted] however, two additional launch positions have been constructed (Figure 5).

These two sites were added within the secured area of B between [redacted] The easternmost site, consisting of a looped road, was present in [redacted], but did not appear cleaned up or finished. The presence of a launcher could not be determined at this time; however, the second control bunker was present and a capability to launch in [redacted] although unlikely, cannot be excluded. By the end of [redacted], the first looped road and launch position were present, but as late as [redacted] the area was not cleaned up and completed in every detail. The second site, consisting of a looped road and launch position, was added between [redacted] and cabling from the triad facility to the new launch position was also observed. Activity was noted in the looped road area in [redacted] an object, approximately [redacted] was positioned on the eastern looped road on [redacted] but was not present on [redacted]

The looped road launch areas again appeared active on [redacted] Coverage in [redacted] has provided little additional evidence of activity at these launch areas; however, the one high resolution coverage on [redacted] did provide more accurate and more detailed information on the entire Complex B.

(2) Complex A

(a) Launch Sites 5 and 6: Sites 5 and 6 were in a late stage of construction in [redacted] with all facilities present and were probably usable at that time; however, later coverage did show that the areas had been cleaned up and construction-related equipment had been removed. Unfortunately, coverage of these sites between [redacted] and mid-[redacted] was of insufficient quality to determine the degree of activity. Good quality coverage subsequent to [redacted] revealed little if any change within the launch areas, giving a general impression that little activity occurred during this time. The better quality coverage of [redacted] including the high resolution coverage of [redacted], provided the best information concerning the two launch sites. The [redacted] coverage provided sufficient detail to identify the launchers at Sites 5 and 6 (Figure 6) as the only good candidates at known SSATC launch facilities for the GRIFFON missile. This same coverage indicates that Site 6 was probably never completed as excavations necessary for duplication of Site 5 were left as observed in [redacted]

In contrast to Sites 5 and 6, their associated electronic area included activity during several periods of photographic coverage which showed changes to this area. The two outrigger electronics, consisting of back-to-back antennas, were still under construction in [redacted]

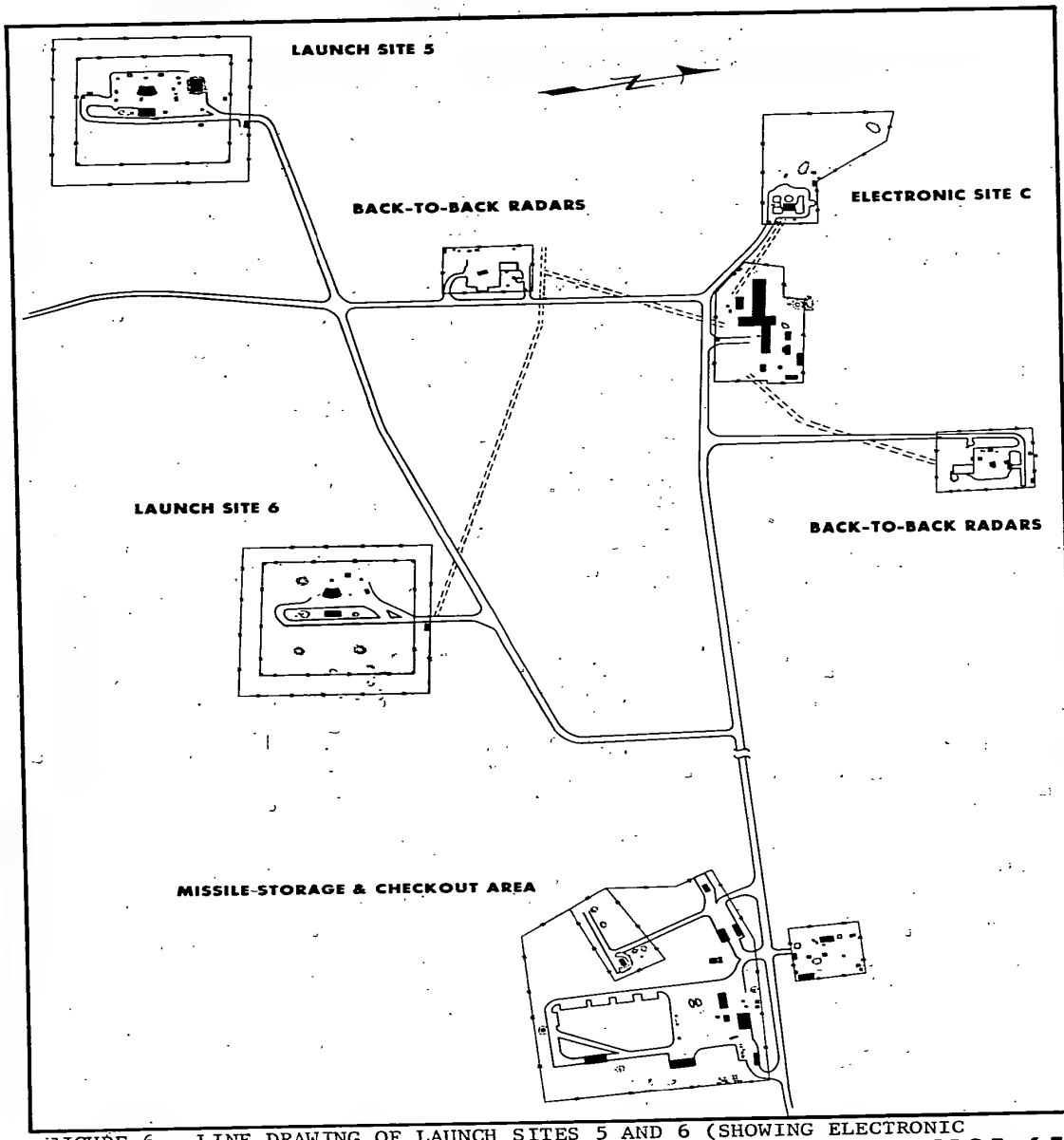

FIGURE 6. LINE DRAWING OF LAUNCH SITES 5 AND 6 (SHOWING ELECTRONIC SITES C AND D), COMPLEX A, SSATC

1960, and the smaller electronic site near the control building was also incomplete. All three were probably completed by late [redacted]. Although the coverage lacked detail; both outrigger shadows appeared identical by [redacted], whereas the northern outrigger had consisted only of a pedestal in [redacted]. The smaller electronic facility was covered by a 50' dome in [redacted]. Between [redacted] an addition was made to the T-shaped building in the central control area. An environmental shelter that was placed over the northern outrigger by [redacted] was removed when photographed in [redacted]. Photographic coverage has indicated a continuing activity within the electronic area from [redacted] to the present time

(b) Launch Sites 1 and 2: Launch Sites 1 and 2 were also observed in [redacted] and were either complete or in a late stage of construction. Their similarity to the SA-2 surface-to-air system sites and the frequent movement of equipments and vehicles suggested that they were designed for a transportable system that was probably derived from the SA-2 system. High resolution coverage of [redacted] (Figure 7) provided evidence that the missiles were of the same general configuration and size as the GUIDELINE missile. Two probable radars that were similar, but not identical, to a FAN SONG were seen in the center of Site 1 along with a number of vans and vehicles. Launchers on position in Site 1 appeared similar to SA-2 launchers. A review of coverage obtained of these sites between [redacted] indicated that Site 1 was occupied on every coverage where sufficient detail was available to determine activity, and Site 2 was active on at least two occasions.

(c) Launch Sites 3 and 4: Launch Sites 3 and 4 were first observed in an early stage of construction in [redacted]. The original configuration of the two sites was complete or nearly complete by [redacted] and their associated electronics were probably complete by [redacted]. Little change has been observed in Site 4 since [redacted] except for equipment and vehicle movements; however, several modifications have been made to a portion of Site 3. Prior to the modification of Site 3, additional hardstands were constructed near the electronic facilities which serve Sites 3 and 4. At the time Sites 3 and 4 were under construction, an expansion in the support facilities was also observed. In the missile checkout and storage area, additional facilities were under construction in [redacted] and were completed by [redacted]. At least 37 additional buildings had been added to the Headquarters and Administration area by [redacted] more were constructed by [redacted]

Site 4 consists of six launch positions surrounding a central control; the launch positions are connected by cable to this central area. Each launch position contains a launcher, [redacted], that is similar, but not identical, in configuration to the SA-2 launcher, a V-shaped road containing a van/equipment at the terminal of each fork of the V, and two small pieces of equipment between the two roads. The launcher is centered at the apex of the V and is surrounded by a prepared area that is approximately 50' to 60' in diameter. Each launch position is road-served and all the equipment appears to be transportable. The central control area, consisting of a circular prepared area with road access and containing

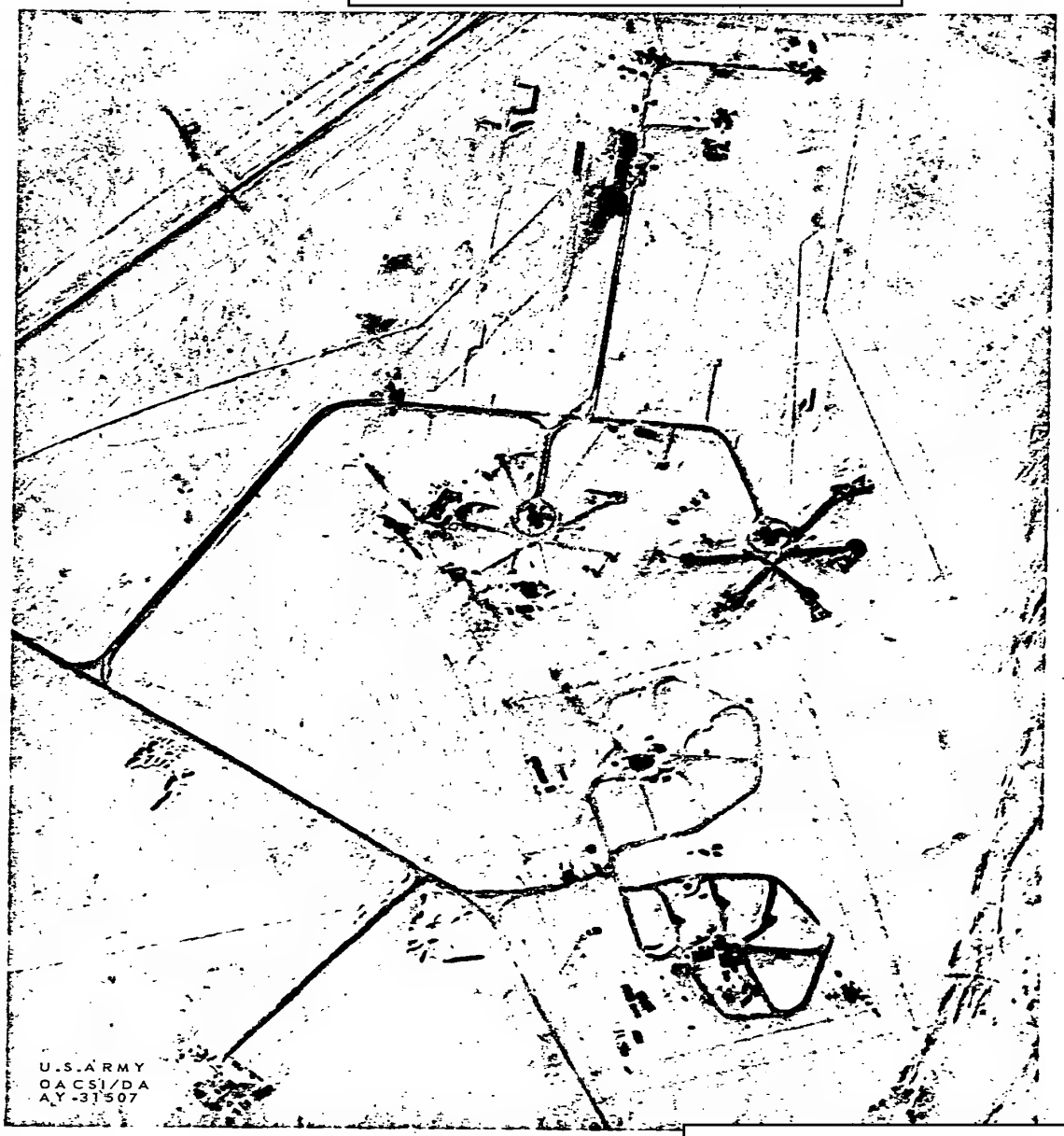

FIGURE 7. LAUNCH SITES 1 - 4, COMPLEX A, SSATC

at least 4 vans and 2 or 3 other unidentified objects, is connected by cable to the three electronic positions in Electronic Site B.

Coverage of Site 4 in revealed that the site was complete and equipment was present in both the central control area and in two of the launch positions. Coverage of late did not reveal as much activity; however, haze hampered analysis. Heavy snow cover on precluded detailed analysis of activity at Site 4. On 2 every launch position as well as the central control area contained equipment and the site appeared extremely active in contrast to Site 3 which had little activity. The three associated electronic positions in Electronic Site B also contained a number of vehicles/equipment. Coverage of did not indicate any activity at either Site 4 or Site 3; however, interpretation was again limited because of haze and cloud shadow.

Two long hardstands and revetments in Electronic Site B were constructed between These areas, as well as the three electronic positions, were cleared of snow both in Pads 1, 2 and 3 of Site 4 were also cleared of snow and appeared active on both dates The roads to pads 4, 5 and 6 of Site 4 were also cleared, but the pads themselves did not appear to be in use. Every detailed coverage since has revealed activity at Site 4, usually on pads 1 through 4 and on some occasions at the other two pads.

Although Site 3 originally appeared similar to Site 4 except for the pair of structures on pads 3 and 4 of Site 3, several major changes have been made in the sites. Pads 1 and 2 have remained similar to the pads of Site 4, and on a few occasions appeared active at the same time as those of Site 4. The most significant change to Site 3 has been the construction of a large revetment around pad 5 and a change in the pad configuration. At the same time pad 6 was also altered to form the same configuration as pad 5 but without the revetment. Some preliminary earth moving for the revetment may have begun as early as but the complete outline of the revetment was not present until During the same period of time a large tower, probably for microwave communications, and an associated structure were completed in the area adjacent to pad 5 which required the realignment of the security fencing surrounding the two launch sites The exact time of completion of the pad 5 modification is unknown, but it certainly did not occur before late and probably not before the first quarter of Based upon the high resolution coverage of it is apparent that the revetment contains a V-shaped pattern with two small objects at one end and presumably a launch position at the opposite end. Inside dimensions of the revetment are 185' by 65'.

c. COMINT-Reflected Launch Activities

Target missiles have been launched from several different launch points into the Sary Shagan area for the development of Soviet ABM systems. Very little information is available from these launchings to make an assessment of the detailed technical characteristics of the systems or subsystems being tested. COMINT, however, does indicate that the Soviets have had and have carried out well-planned programs in their ABM development.

TABLE 1. TABULATION OF SSATC PARTICIPATION IN FIRINGS

Launch Point		Kapustin* Yar	Kapustin* Yar	Makat SP-12	Chelkar SP-5	SP-2	D-4B
Missile		8K65	8K63	8K63	8K51	8Zh38	-
Range(Approx)		1050	1050	780	517	275	
YEAR	QTR						
1957	3rd					8	
	4th						
1958	1st						
	2nd						
	3rd					4	
	4th				5	1	
1959	1st		1				
	2nd		6				
	3rd		3				
	4th		4		2		
1960	1st		5				
	2nd	2	3		1		
	3rd		18		2	4	
	4th	2	9		9(5)		
1961	1st	2	10	2(2)	6(5)		
	2nd		10	3(3)			
	3rd		10				11
	4th		19(5)		8(5)		5(5)
1962	1st		6		1(1)		
	2nd		19(3)		3(3)	1(1)	
	3rd		9				
	4th	3	22	6(2)			
1963	1st		7	9(3)			
	2nd		7	2(1)			
	3rd		13	2(1)			
	4th		13	2(1)			
1964	1st		11	4(4)			
	2nd		3				
	3rd		13				
	4th		8				
1965	1st		2				
	2nd		3	3**			
	3rd						
	4th						
TOTAL		9	234(8)	33(17)	37(19)	18(1)	16(5)

25X1D [redacted] there is no way to determine the participation of SSATC since the communications link had been deactivated. All firings to the area have been included since that time.

() Numbers in parentheses indicate possible intercept attempts.

**No SSATC communications intercepted.

25X1D

approximately 50 SS-4 missiles in which the SSATC indicated an interest were launched from Kapustin Yar to Sary Shagan. Since that time, the Sary Shagan interest or degree of participation cannot be determined for each individual SS-4 firing; but approximately 180 additional firings have been conducted to the area from Kapustin Yar. Eight of these have been accompanied by timing signal sequences which probably resulted in AMM launches. (Five launchings were associated with the nuclear tests in October 1961 and three were conducted in a normal test environment in June 1962.) Nine SS-5 missiles were also fired from Kapustin Yar to the Sary Shagan area. The SSATC indicated an interest in the first two of these firings, but again the degree of their interest in later firings is unknown.

25X1D

The first eight launches from a downrange launch site occurred from "SP-2", approximately 280 nm from Sary Shagan. Five additional launches of SS-2 missiles from "SP-2" were detected in the 25X1D and four additional launches occurred in the third quarter . One 25X1D possible "SP-2" operation has been tentatively related to an AMM 25X1D intercept, but the evidence is not conclusive. Since no other AMM intercepts against target missiles from "SP-2" have ever been intercepted, the association remains tenuous.

The early stage of construction at the SSATC (known from COMINT evidence) and the degree of completion in preclude the use of the 25X1D "SP-2" firings of 1957 and 1958 as tests of the AMM system, but they could have been used for feasibility testing of off-the-shelf electronics items and for checking some of the impact area equipment as it was installed for use in a re-entry measurement program.

The first SS-3 missile firings from "SP-5", another downrange launch point (48°07'N, 59°35'E near Chelkar), occurred in the last quarter of 1958 and had a range of about 520 nm. These firings, as well as the first 13 firings from "SP-2", were to the "T-1" impact area and all are believed to have been associated with, or for the benefit of, instrumentation surrounding the impact area. The two SS-3 firings in 1959 from "SP-5" were to a new impact area, designated "T-5", as were the next three SS-3 firings in the second and third quarters of 1960. Field site launchings in 1960 of surface-to-surface missiles are believed to have been a final checkout of the complete AMM 25X1D electronic system. The loss of readable range traffic in late 1960 prevented the identification of the impact area utilized in the "SP-5" firings beginning in and in all subsequent firings from any launch point. This unfortunate loss at the very beginning of the intercept test program at Sary Shagan has left many unanswered questions concerning the Soviet concept of AMM research and development.

25X1D

, the major testing effort involved SS-3 target missiles from "SP-5" and probable intercept tests 25X1D from the SSATC. During the period a total of 27 SS-3 target missile and 19 AMM launches occurred, and several additional operations may have resulted in cancellations or failures (Table 1). No operational activity involving "SP-5" has been intercepted since 25X1D and there is no evidence of a planned renewal of this phase of the test program.

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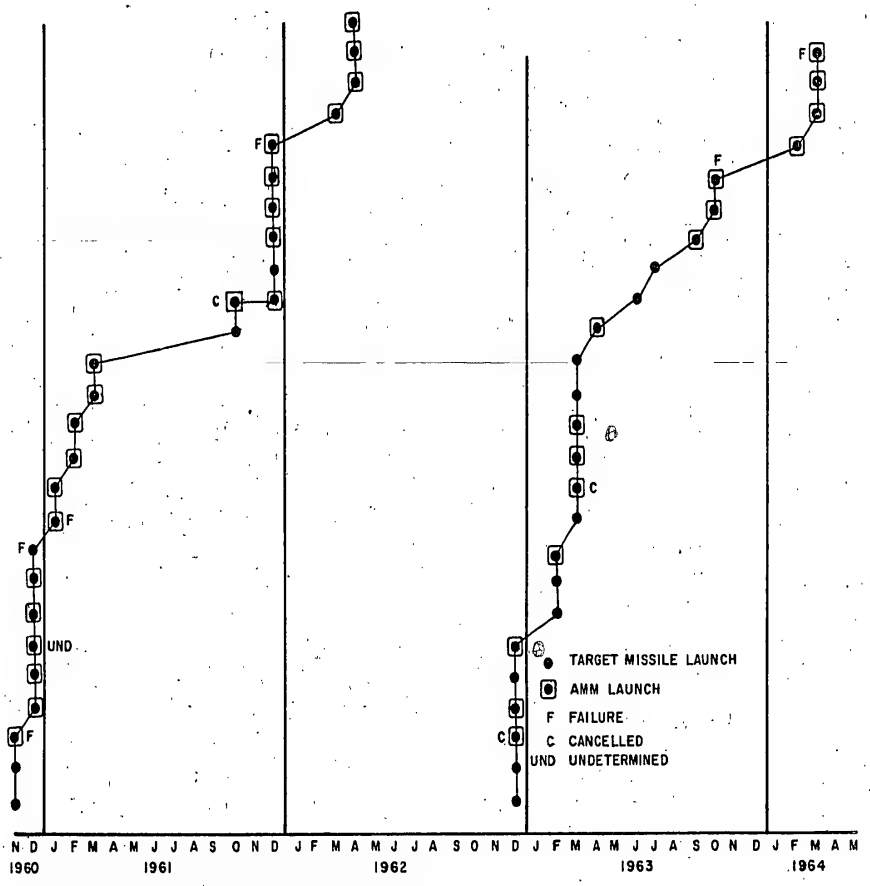

FIGURE 8. TARGET MISSILE AND AMM TESTING ASSOCIATED WITH CHELKAR AT MAKAT

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This lack of further activity cannot be satisfactorily explained, but the two most probable explanations are: (1) completion of that particular R&D phase, or (2) depletion of the Soviet surplus inventory of SS-3 missiles.

The early and predominant use of SS-3 missiles in the AMM program may be explained as follows: only a limited number of SS-4 missiles was available because the system was undergoing research and development, SS-4 missiles were being fired by the KYMTR for their own programs, and the SS-4 deployment program was underway which required the Soviets to use the older SS-3 for the initial AMM-related efforts.

Launchings of the SS-4 as a target missile from a new downrange launch point near Makat occurred during the first half of 1961, but only five target missiles were launched and AMM intercepts were conducted against all five targets. The utilization rate of target missiles for AMM intercept attempts has not been observed at any other time except for the last four SS-3 launchings from "SP-5" in 1962 and the four valid operations in 1964. Following these five launchings, no further activity from Makat was observed [redacted] 29 target missile launchings from Makat and 12 AMM intercept attempts from the SSATC have been conducted; but no further operational activity from other downrange launch points has been identified. 25X1D

Figures 8, 9, and 10 show the different tests that have been associated with the SSATC since the Chelkar tests began in [redacted] 25X1D
[redacted] 25X1D

Figure 8 shows the target missiles and AMM tests that have been associated with Chelkar and Makat. From the data it looks as if almost the same test program was carried out in both of these test phases. Beginning with the Chelkar launchings in [redacted], there were 27 target missile launchings (including one failure) with 22 periods of AMM activity (4 failures, 1 cancellation and 1 unidentified) extended over a period of 18 months. The Makat activity that began in [redacted] lasted for 16 months, and consisted of 25 target missile launchings (no failures) with 15 periods of AMM activity. Other similarities in the two programs are: 25X1D 25X1D

1. Each program tapered off after 15 target missile launchings;
2. Chelkar had 15 target missile launches in 5 months, Makat had 15 target missile launches in 4 months;
3. Each program had two periods when 6 target missiles were launched in one month.
4. Both had a lull before the test phase was completed with four target missile launchings and four AMM intercept attempts.

25X9 Figure 9 shows the Chelkar and Makat launchings again, and includes the 1961 Makat launchings, the activity from Kapustin Yar in 1962 and [redacted] These tests could have possibly been for final system checkout or for feasibility testing for the next phase in the development period. Antitactical ballistic missile activity, which was initially reflected in 1961, has continued to be noted up to [redacted] 25X1D (Figure 10).

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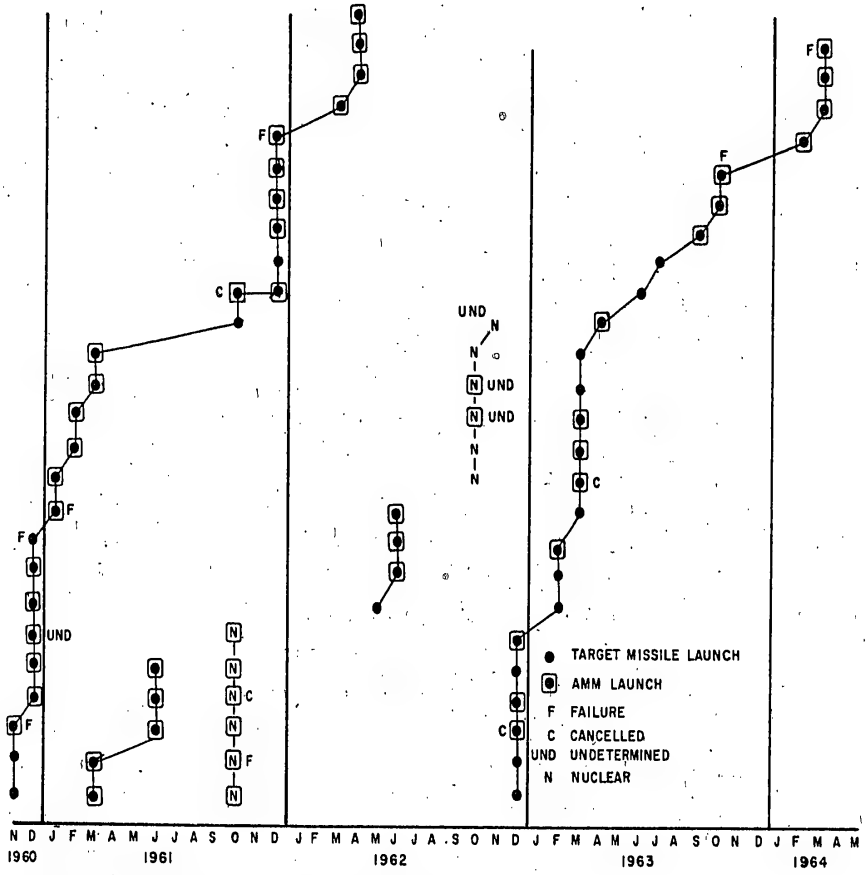

FIGURE 9. TARGET MISSILE AND AMM TESTING: MAKAT–1961, KAPUSTIN YAR–1962

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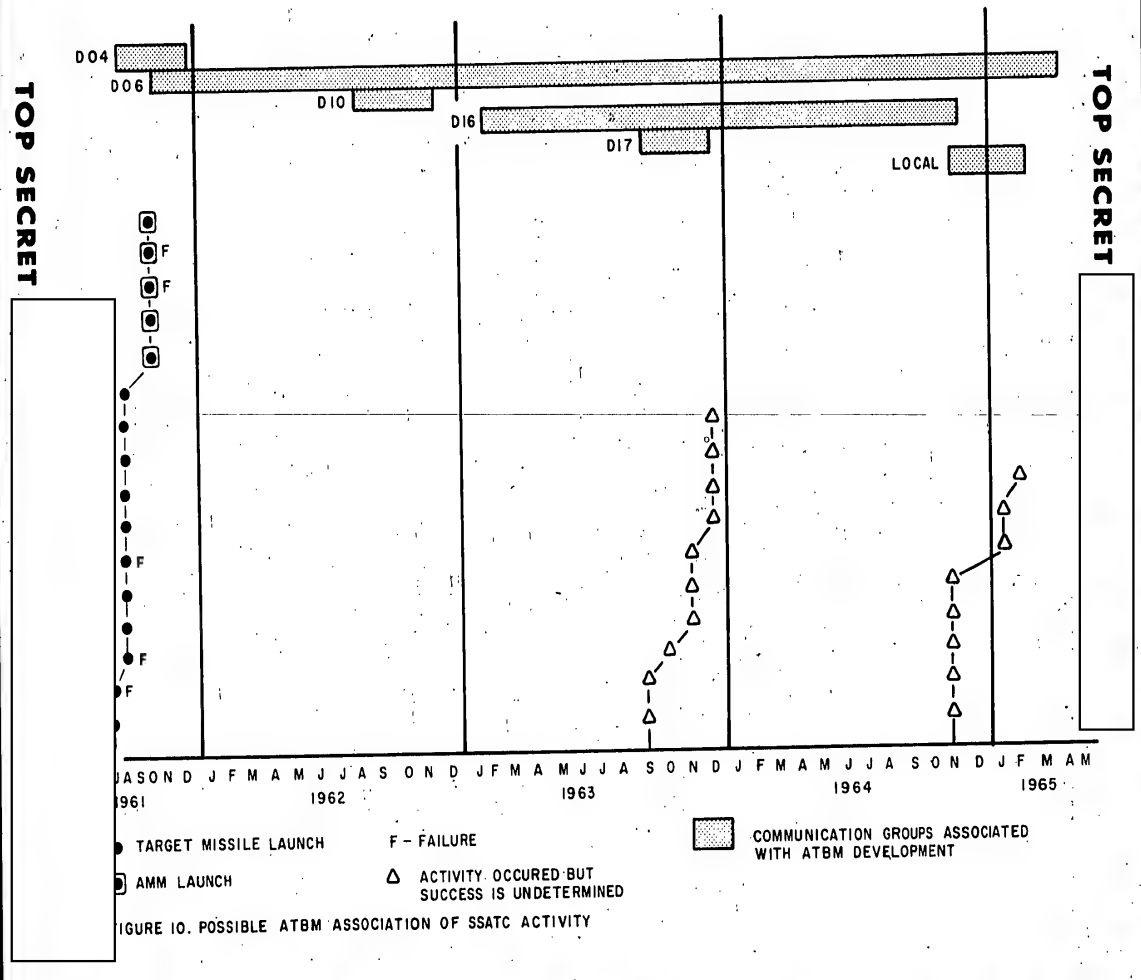

IGURE 10. POSSIBLE ATBM ASSOCIATION OF SSATC ACTIVITY

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Information concerning SSATC target missile firings and ABM intercepts between [redacted] indicates that the Soviets probably attempted to adapt the SA-2 missile system in an antitactical ballistic missile role. Two phases of test activity were reflected on the D04 communications group: the first phase consisted of possibly 11 target missile launches or attempted launches during [redacted] with no apparent AMM attempts; the second phase included five target missile launches and the launching or intent to launch five ABMs during [redacted] Both phases of testing had a number of failures, and the test program is believed to have been unsuccessful since no further reflections of the activity have been detected.

The D04 group was positively identified on [redacted] although it may have been active as early as [redacted] The group consisted of a control station at Sary Shagan and an outstation at the unlocated target missile launch point, its communications being made up of Morse traffic and timing signals. Radio frequency usage suggests that the outstation was located between 150 and 250 nm from Sary Shagan; however, timing signal data concerning the valid operations suggest a much shorter range in the order of 35 nm. Although the inconsistency of frequency cannot be satisfactorily explained, it is thought that a shorter range target missile was used.

Procedures observed on the D04 link during the operations were consistent with those observed on other SSATC communications groups. In some instances the wide pulse in the timing signal was not reported for what appeared to be valid launches; however, when tapes were available, it was found that a wide pulse was present. It has been assumed that all operations which contained other valid launch indicators except the wide pulse were valid launches. During this period, the local SSATC timing signal appeared for the first time in range communications and was first observed participating in D04 operations on [redacted] when it was synchronized with the D04 control timing signal.

Considerable difficulty was noted in the operations and at least six postponements/cancellations were observed during the first phase of activity. Attempts were made to fire two target missiles within approximately 10 minutes and apparently utilizing the same countdown on [redacted] and possibly on [redacted] but the successful launch and flight of both missiles were not achieved until [redacted] Two missiles were also successfully launched on [redacted] however, the AMM launches appear to have been failures on this date. The large number of delays, the numerous cancellations/postponements and the failure ratio of both target missiles and AMMs suggest that the tests were unsuccessful. However, if the test objectives were feasibility testing of an existing surface-to-air system in an ABM role, the test series may have been successful in determining limitations of the system and requirements for modifications to this role.

Between 1959 and 1961, Soviet authors proposed that existing SAM systems be modified to provide an antitactical ballistic missile defense. An examination of known Soviet SAM systems indicates that the SA-2 system would be the most likely candidate; but even with this system it appears that

considerable modification would be required. Considering the time of the D04 tests in the light of the apparent difficulties and the lack of later testing, feasibility testing of the SA-2 system seems the most likely objective of the test series. The presence of SA-2-type sites at Sary Shagan, which were probably completed prior to the D04 activity, provides evidence of interest in the SA-2 system in an ATBM role.

Assuming that the SA-2-type sites were the launch point of the antimissile missile, it is likely that an impact area nearer to the sites than "T-1" would have been utilized. Timing signal data indicate a target missile flight time of about 185 seconds, with ABM launch occurring approximately 126 seconds after target missile launch. Using a SCUD target missile with a nuclear warhead configuration and a flight time of 185 seconds, a range of approximately 35 nm could be achieved. To achieve reasonable intercept altitudes and ranges, an impact area somewhat closer than "T-1" would be required if launch of the ABM occurred at one of the known SSATC launch areas. Frequency usage of the D04 group is not consistent with the suggested short ranges; however, longer range target missile firings may have been planned if the first series of tests had proven successful.

25X1D 25X1D

25X1D The next reflected ATBM association occurred from [redacted] when the D17 group was noted active. The D17 group control was located at Sary Shagan, and the D17 B outstation was probably located in the general area of Dzhezkazgan and "SP-2".

Although it cannot be proved from timing signal data that valid launches occurred at this time, a renewed interest in short range target missiles is indicated. The only other short range target missile interest since 1963 has been reflected on the local Sary Shagan timing signal in late 1964 and early 1965.

25X9

25X1D [redacted] that occurred in [redacted] 25X1D

[redacted] (Figure 10), it can be seen that the SSATC was involved in some type of ABM development from [redacted] 25X1D in what appears to be a well laid out development program.

From COMINT data, it is suggested that the SA-2 was involved in the D04 activity in 1961. It is possible that an SA-2-type system has continued to be under development for use in an ATBM role since the activity in 1961. Available data suggest that a new ABM was probably used in the Makat activity that began in December 1962.

2. AMM-Related Deployment

a. Launch Sites

(1) Sites 1 and 2

Activity suggests a continuing effort or interest in an SA-2-type antitactical ballistic missile (ATBM) program. The electronics associated with this system (ATBM-2) does not appear to include FAN SONG configured radars, but rather smaller, possibly more mobile radars. Previous

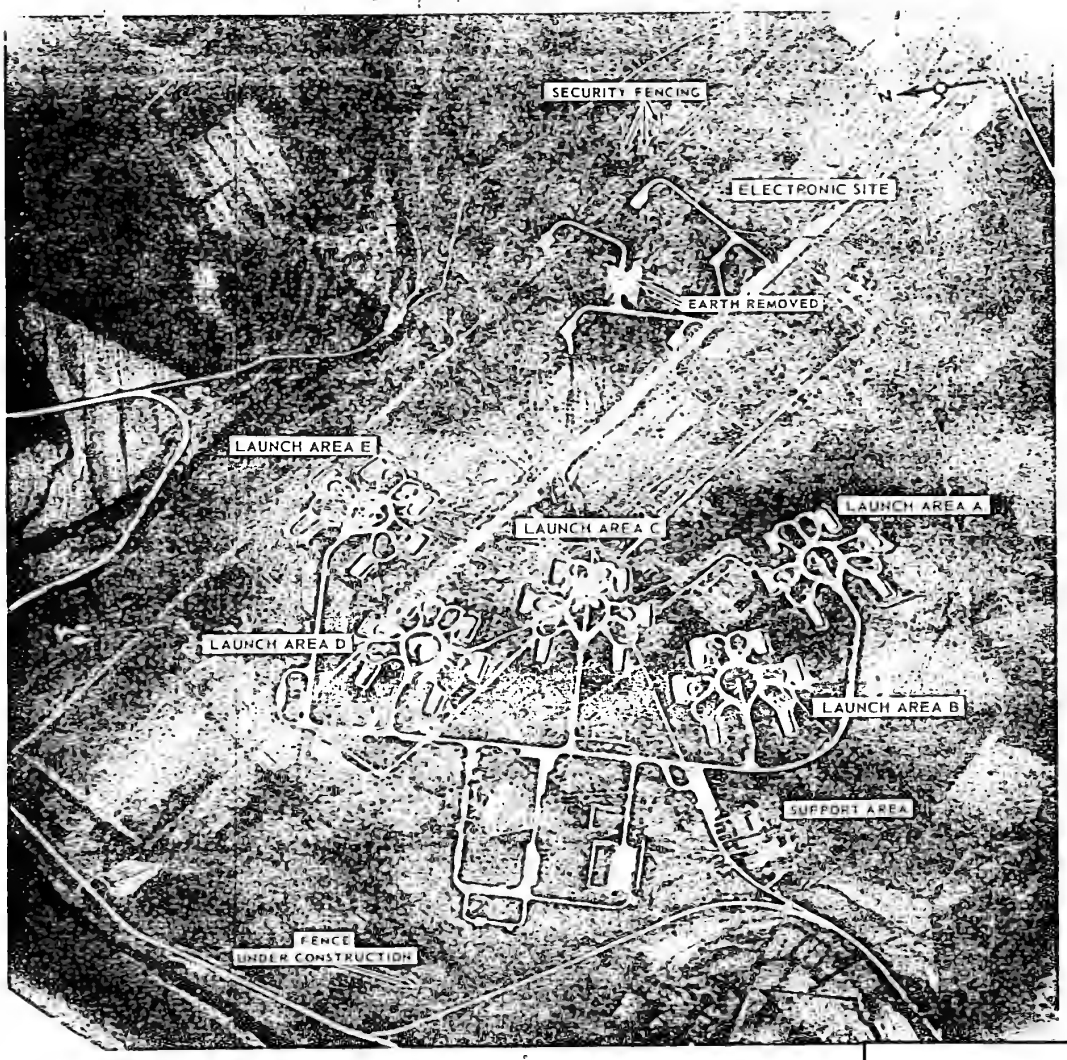

FIGURE 11. AMM/SAM LAUNCH COMPLEX, TALLINN.

studies of SA-2 system capabilities, in an ATBM role, have indicated a lack of electronic capability and system mobility. An ATBM system with short system reaction times and sufficient electronics could employ a GUIDELINE-like missile.

The probable ranges of the target missile associated with Sites 1 and 2, as implied by [redacted] data, are estimated to be less than 50 nm; however, the possibility exists that the 150 nm field launch point may be utilized for target launchers. The probable field launch sites about 45 nm NW of these sites are good candidates for SCUD-like missiles. A 7- to 12-second dead-time launch envelope normally associated with the guidance function of the GUIDELINE missile is also suggestive of target velocities compatible with SCUD-like missiles.

The continued effort at Site 1 over the past years is more than suggestive of R&D testing and indicates an anticipated missile system with a real potential.

(2) Sites 3 and 4

The electronic area associated with these sites is similar in configuration to the probable electronic areas at Tallinn, Cherepovets and the Leningrad ABM complexes. The general alignment of the electronic launch area (NE) suggests that the area of interest is NE; however, the known impact areas lie WNW of these sites, which indicates that launchings probably have been conducted broadside to the apparent site alignment.

The separation distance between the electronic and launch areas (about 2500') favors a vertically launched missile and the distance possibly is dictated by the elevation acceleration rate of the missile. The electronic area could be positioned to favor both elevation and azimuth slew rates required of a vertically launched missile. This apparent orientation suggests that the electronic area is associated with missile guidance and track functions. The size of the associated radars favors a missile or target tracking function as opposed to a target acquisition function.

(3) Tallinn

The construction effort is continuing at this site, some revetments containing launcher-related equipment similar to that seen at Launch Position 5, Site 3 (Figure 11), Complex A, SSATC. The dual rails appear to be V-shaped, and are elevated a few feet above the floor of the revetment. No electronic equipment has been observed at this site, but the hardstands will probably support equipment similar to that observed at the NW Leningrad ABM complex.

(4) Cherepovets

The Tallinn-like site at Cherepovets is oriented generally north and is possibly for the missile defense of the Moscow area. The slant range requirements for this site would be in the order of 100 - 200 nm for the defense of Moscow proper. These long range intercepts would require

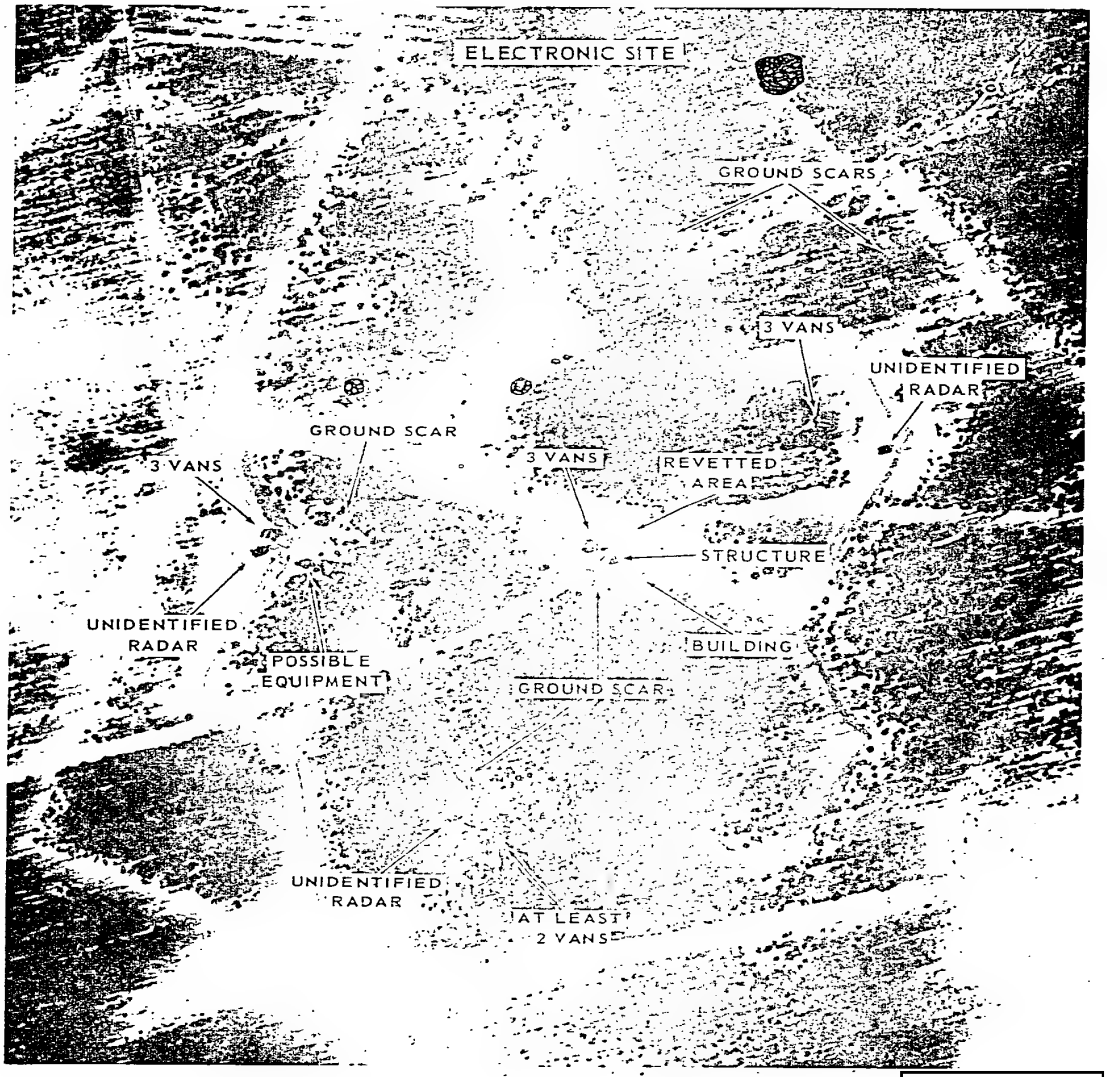

FIGURE 12. NORTHWEST PROBABLE AMM LAUNCH COMPLEX, LENINGRAD

acquisition capabilities far in excess of those of the small radars that are believed to be associated with the system. If these sites are to be utilized as forward defense sites, the suspected altitude of intercept would suggest that the long range acquisition would be performed by a remotely located installation such as Olenegorsk The DOG HOUSE installation could function as an early warning/acquisition radar for this system, but the remote location of Cherepovets would present formidable data handling problems.

(5) Leningrad

25X1D

The first over-all site modification/addition to the Leningrad ABM complexes was observed in [redacted] at the NW Complex (Figure 12) when five elevated equally spaced mounds were constructed outside the southeast corner of the complex. Later observations revealed that three of the mounds contained electronic equipment and some of the launch areas had undergone modifications; that is, the installed launcher and equipment appeared to be similar to those at Complex A, SSATC.

25X1D

The modification to the NE complex, which was initiated about [redacted] included elevated hardstands that appeared to be under construction in the old complex control center area, one position consisting of a 50' elevated mound with a 300' base. The location of these probable electronic areas in a peculiar position suggests that the electronics is limited or favors a functional azimuth.

The SW complex appears to be undergoing similar modification since elevated hardstands are being constructed east of the probable complex control center.

b. Electronics

(1) Outriggers

25X1D

In order to better evaluate the electronic installations seen at the Leningrad outrigger or BEER CAN Sites, scale models were made of one of the BEER CANS and of the outrigger at Electronic Site C, Complex A, SSATC (as seen in [redacted] and then photographed.

Figures 13 and 14 are photographs of a model of the Leningrad BEER CAN electronic site. Figure 15 is a photograph of the model of the antenna structure seen at Electronic Site C, Complex A, SSATC: the model was made with an end box on each of the large dishes; however, the quality of the photography does not permit confirmation that the actual antenna does in fact have these end boxes.

It is felt that the antenna structure was originally intended to be emplaced on top of the BEER CAN structures at Leningrad in the deployment of the GRIFFON missile system. Since the GRIFFON is no longer expected to be deployed at Leningrad, it is unlikely that the antennas will appear on top of the BEER CANS. Figure 16 is a photograph of a model of the back-to-back antenna array atop BEER CAN and shows how these installations would have probably appeared had the Soviets completed them. An analysis of these antennas was presented in MK 1-65, published in [redacted] 25X1D

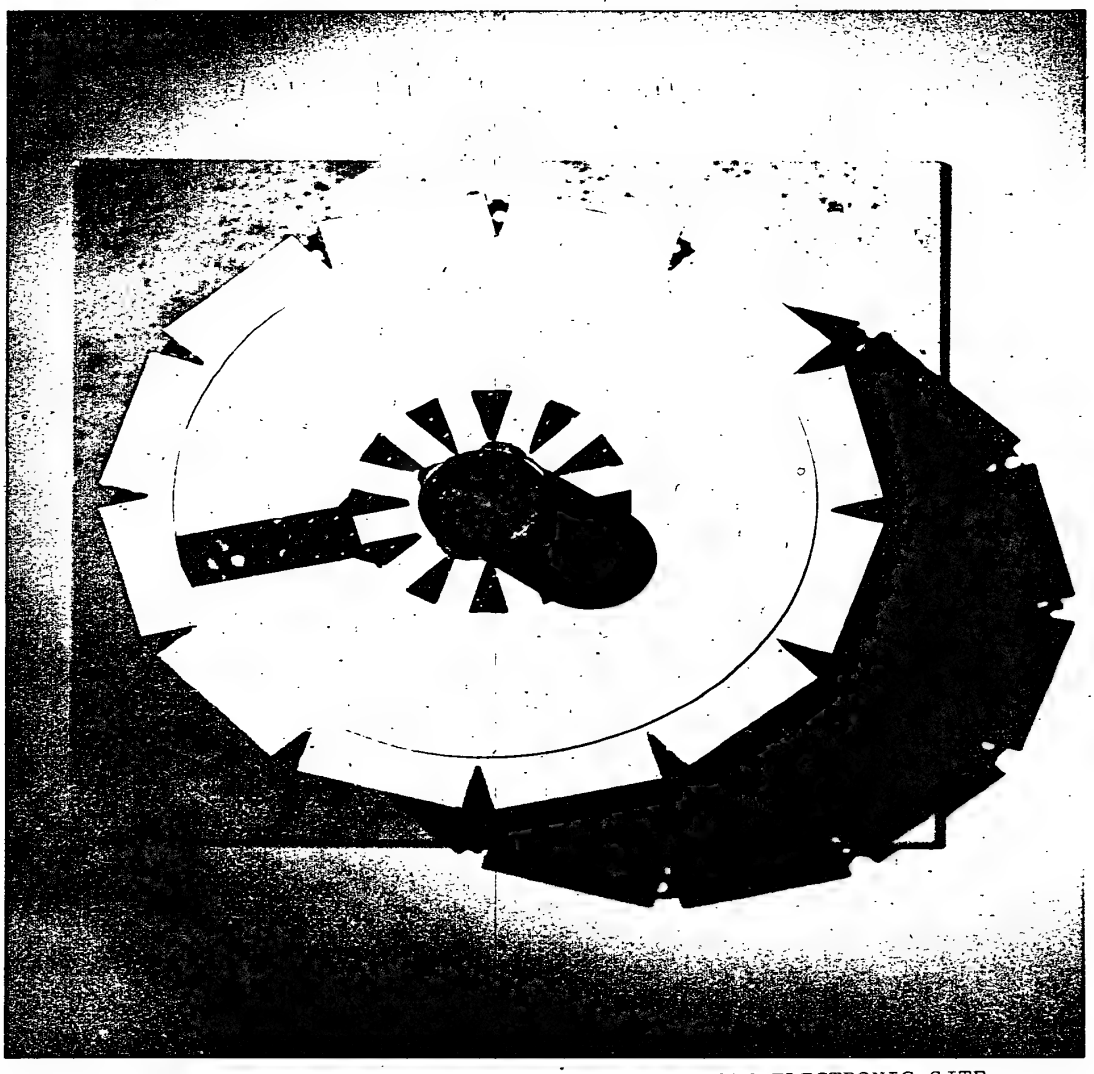

FIGURE 13. PHOTOGRAPH OF MODEL OF LENINGRAD BEER CAN ELECTRONIC SITE: TOP VIEW

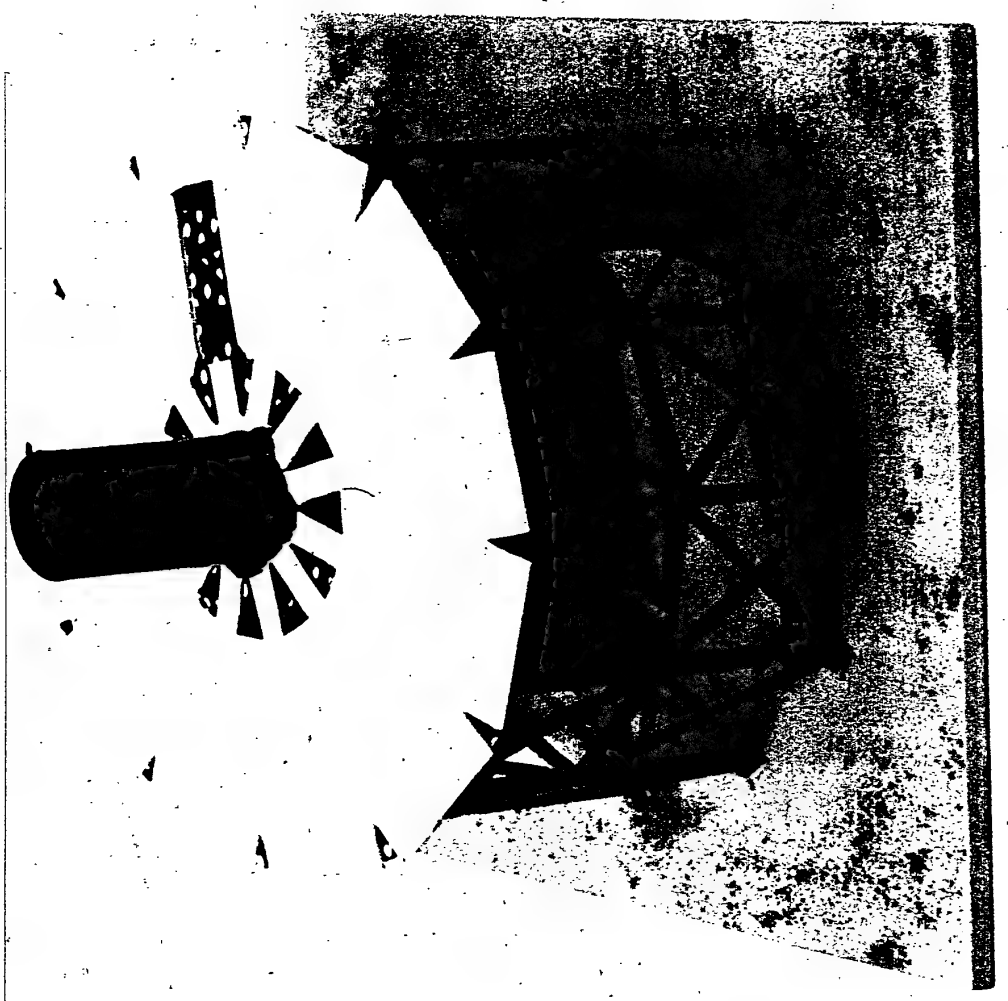

FIGURE 14. PHOTOGRAPH OF MODEL OF LENINGRAD BEER CAN ELECTRONIC SITE: SIDE VIEW

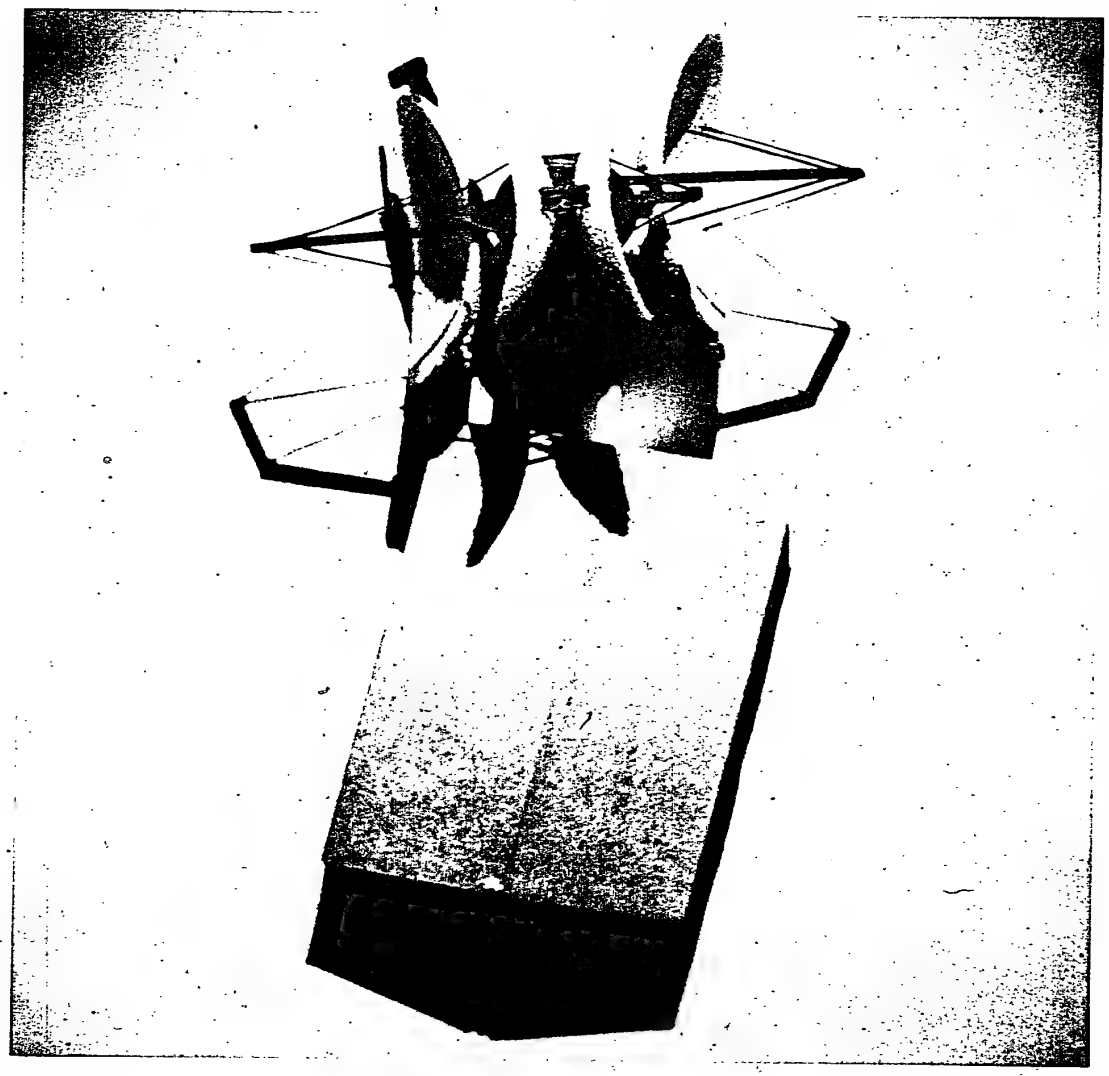

FIGURE 15. PHOTOGRAPH OF MODEL OF ANTENNA STRUCTURE AT ELECTRONIC SITE C, COMPLEX A, SSATC

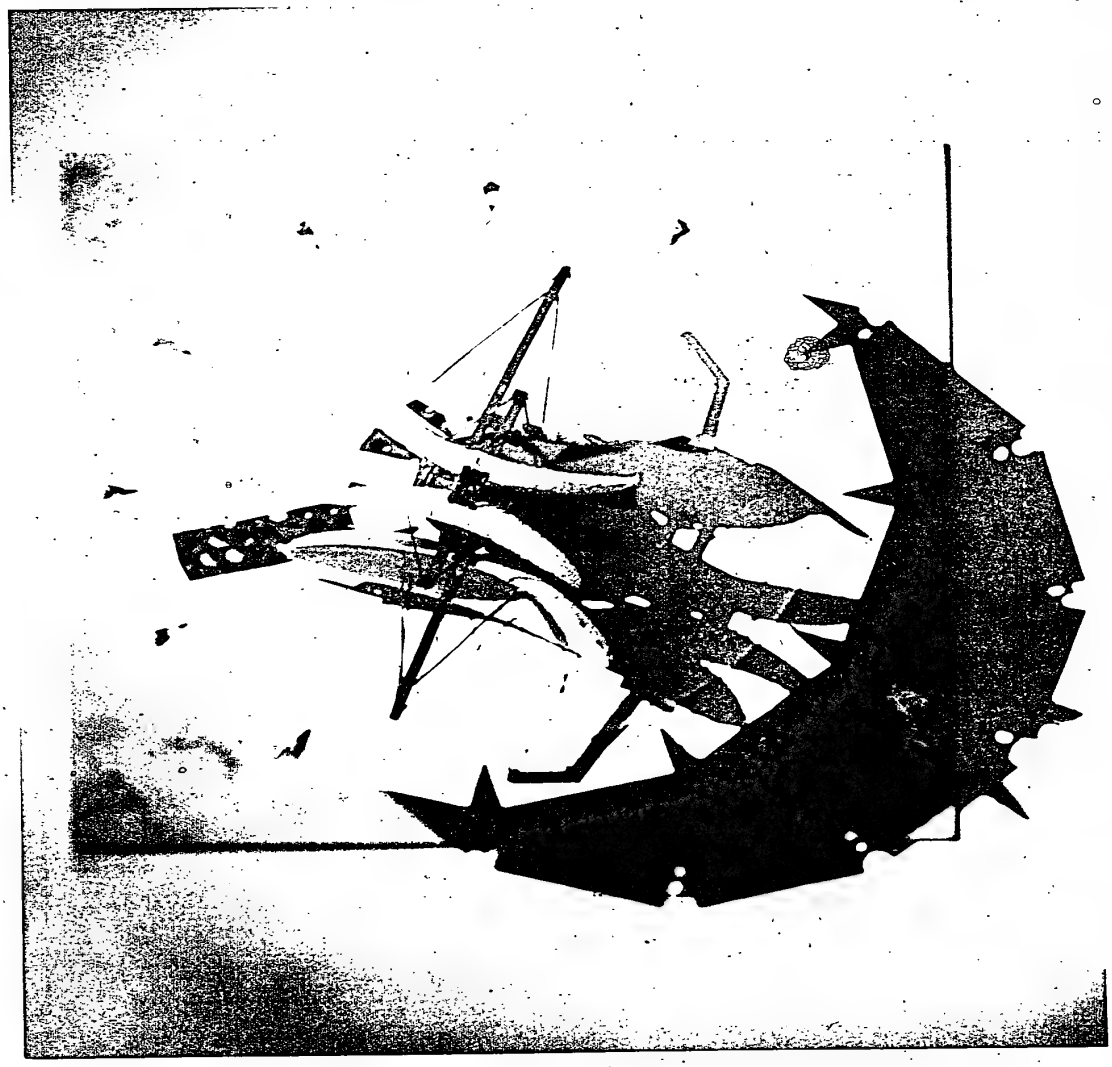

FIGURE 16. PHOTOGRAPH OF MODEL OF BACK-TO-BACK ANTENNAS ATOP BEER CAN

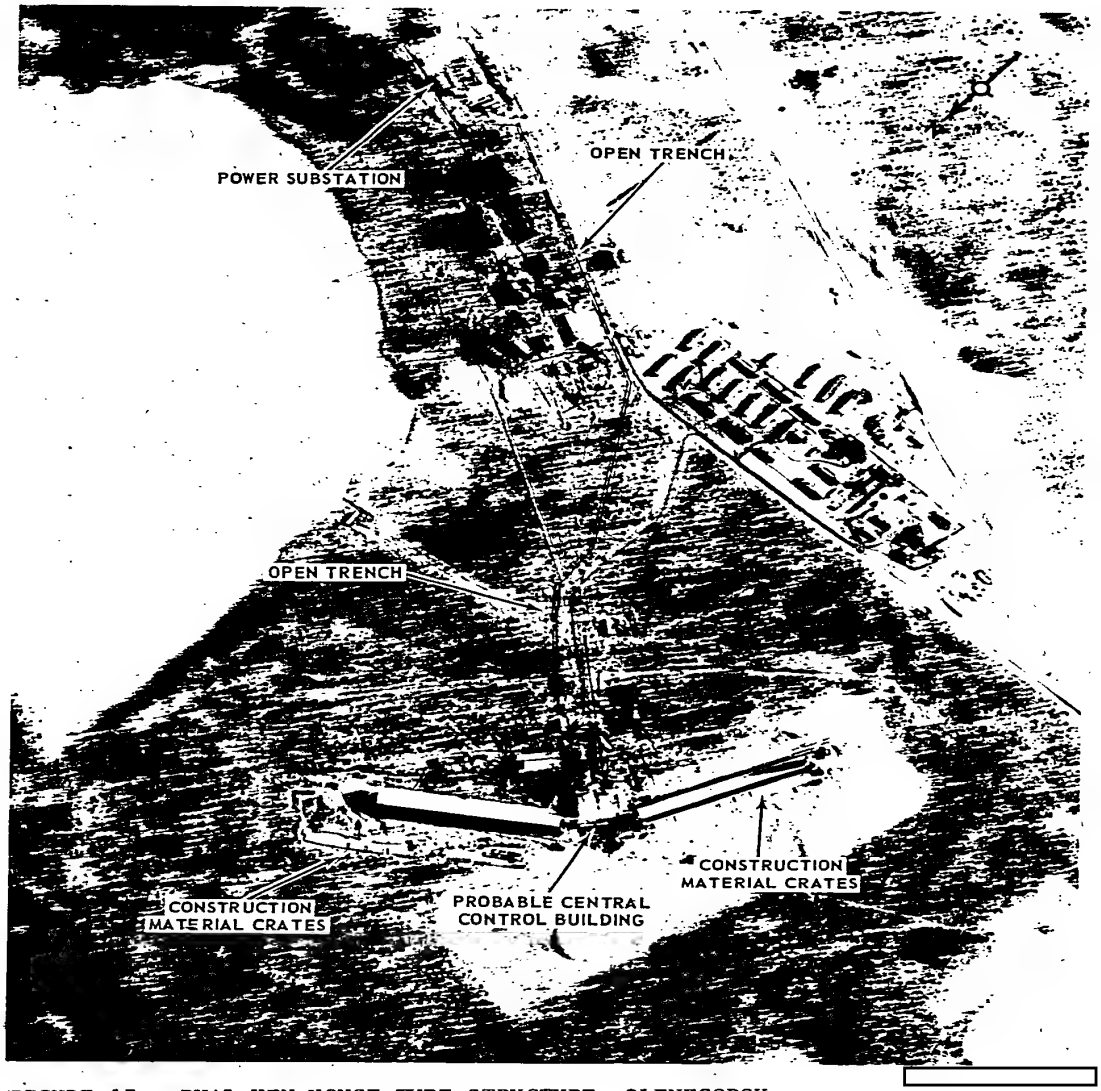

FIGURE 17. DUAL HEN HOUSE-TYPE STRUCTURE, OLENEGORSK

(2) ZARF

25X1D

A new signal from a frequency-scanned radar that bears close resemblance to the BV01 (formerly BUEB) was detected on [redacted] during the period [redacted] A probable source for this signal is the original HEN HOUSE radar at Sary Shagan, but the characteristics of the signal suggest that the intercept may have been from a test of a prototype system similar to that being installed at Olenegorsk.

The azimuth sector scanned by the radar, which is believed to be about 35°, is probably the result of the radar frequency scan. This 35° sector is more compatible with the relative orientation of the HEN HOUSE radars at Olenegorsk (Figure 17) than the BV01 signal.

The signal characteristics bear some relationship to the BV01 signal: both signals have the same number of pulse groups/sweep and approximately the same frequency; the PRF of the new signal is one-half that of the BV01, its sweep period is two times that of the BV01. The two signals differ in pulse duration and grouping; the characteristics of the new signal are listed below:

1.	PRF:	48.8 pulses/sec
2.	Pulse Width:	1000 ± 20 microseconds
3.	Frequency:	153.7 to 162.2 ± 0.5 megacycles with a periodic sweep from the lower limit to the upper limit and an abrupt reset.
4.	Sweep Period:	10.49 seconds (normal)
5.	Pulses per Sweep:	512
6.	Pulse Grouping:	Each pulse is a single pulse rather than the 4-pulse group of BV01. However, the pulses are divided into two interlaced groups, each with a PRF of 24.4 cps.

The characteristics of this signal strongly indicate a radar designed for long range detection rather than precision tracking. The PRF gives an unambiguous range of 1660 nm and possibly an unambiguous range of 3220 nm if the two interlaced pulses can be distinguished by the receiver. The lengthening of the pulse duration of 10 significantly increases the long range detection capability, but degrades the range accuracy unless pulse compression is employed. Angular accuracy capability is degraded by the lack of the BV01 pulse grouping, although it is possible that the arrangement of the two interlaced pulses may partially compensate for this degrading.

(3) Moscow Complex

The Triad facilities at Moscow SAM sites have undergone little change since the publication of MK 1-64. No additional construction has been observed at E-15 since [redacted] The buildings for a second Triad are in an early stage of construction at E-33 and E-05.

25X1

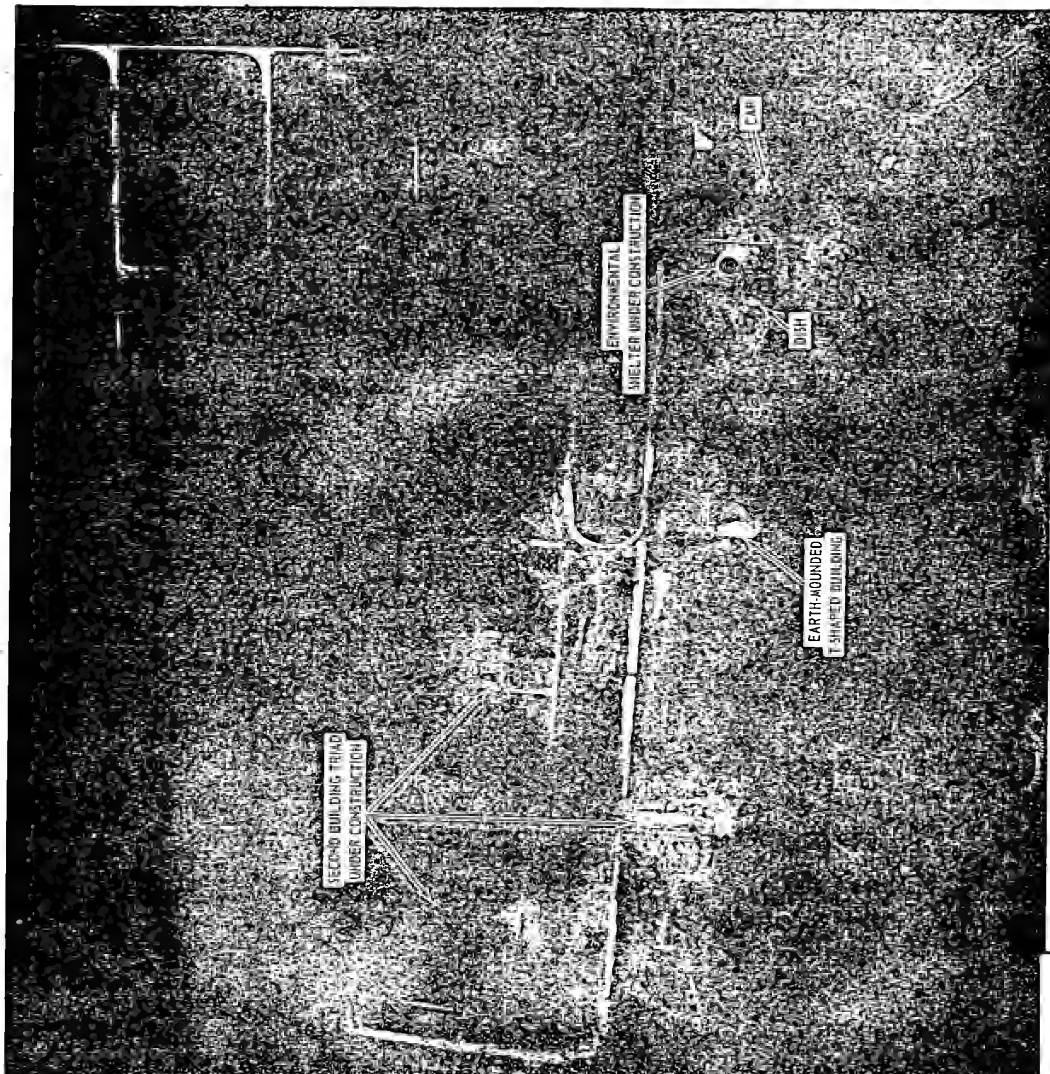

FIGURE 18. TRIAD AREAS, SAM SITE E33-1, MOSCOW

25X1D

The environmental shelters have been placed on the large building of the first Triad at E-33. (Figure 18) Ground scarrings that were initially observed on suggest that a Triad will be constructed at E-31.

3. Preliminary Analysis of GALOSH Missile

a. Background

25X1D 25X1D 25X1D

(1) The GALOSH missile was first shown in the (Figure 19) Moscow parade, and subsequently in the Moscow parade. The missile is transported in a cylindrical container that is in diameter. The container is mated to a 2-axle bogie and pulled by a 4-axle tractor.

25X

(2) The GALOSH missile was seen again on the Soviet video release, "Rockets on Guard for Peace", which provided the engineer with the general vehicle configuration that heretofore was only a "best estimate."

b. General Conclusions

(1) The best present estimate is that the GALOSH is a two-stage missile; both stages are assessed to be solid. The missile design performance lies between the U. S. SPRINT and the ZEUS.

(2) The important indications from the preliminary engineering analysis are that the GALOSH may be designed to achieve intercepts within the atmosphere as well as have an exoatmospheric mission capability. Previous estimates only indicated a long range high altitude (exoatmospheric) mission.

(3) Significant features of the GALOSH configuration are:

(a) The absence of aerodynamic control fins on the sustainer stage indicates a reaction control, spoiler or some form of jetavator control.

(b) The second stage is designed to achieve minimum drag. The ramifications of these two features are critical, especially in (a) above, in assessing the vehicle's mission capabilities. The control system is important in determining how far the GALOSH is controlled along an intercept trajectory. A detailed analysis of the possible control system is being made to assess the guidance constraints and vehicle maneuver capabilities so meaningful parameters can be established.

(4) A preliminary analysis of the effect of mensuration on vehicle performance has been made. Calculations show a fairly insensitive effect of sustainer length and cone angles on vehicle performance. A 4^{o} semi-apex angle for the sustainer section was used as a base for calculation. Plus 1^{o} (5^{o} semi-apex angle) does not meaningfully affect gross performance. A booster length of 22'-23' is compatible with external indicator on the GALOSH container and the video mensuration.

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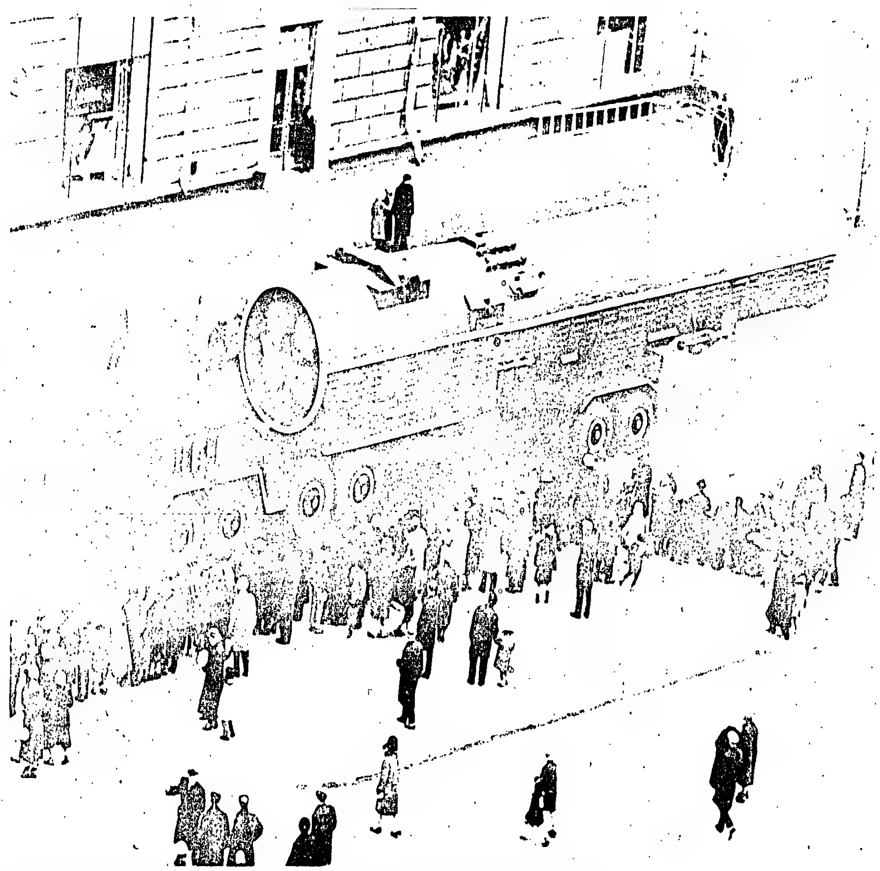

FIGURE 19. PHOTOGRAPH OF GALOSH MISSILE DISPLAYED IN MOSCOW PARADES

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(5) Preliminary conservative performance parameters are shown below:

	Booster	Sustainer
Thrust	1,014,000	253,500
Burntime	6.5	6.5*
Propellant weight	30,720	7,860
Propellant flow rate	4,726	1,181.5
Initial weight	45,000	15,000
Specific impulse(SL)	214.5	214.5

(6) The missile flyout envelope of range vs altitude and time is shown in Figure 20. Launch angles (QE) were varied and the missile followed a ballistic path after burnout. Performance data are as shown above. The effects of increasing specific impulse to 260 seconds (vacuum) with other factors held constant, can be seen in the trajectories shown in Figure 21.

4. Indications of Continuing AMM Test Activity

a. Additional SSATC Instrumentation

The instrumentation sites at SSATC were examined from the viewpoint of trying to establish an area for interceptor flight tests that would not necessarily involve a target missile.

25X1D

A missile the size of the GALOSH would involve a test range with distant instrumentation points since the flyout of the missile would be observable at ranges exceeding 200 nm. The most likely candidates for this type of instrumentation at SSATC are sites 14, 15, 16, and 17. It is interesting to note that these sites are located on a line with an azimuth of [redacted] and that each site has a radar B oriented at a near right angle to this azimuth (Figure 22). A missile launched from Launch Complex B on an azimuth of [redacted] would travel parallel to sites 14, 15, 16, and 17 at a ground range of approximately 32 nm. The ground range along this azimuth from Launch Complex B to a perpendicular from Instrumentation Site 15 is approximately 225 nm. The range to the closest of the 4 sites, Instrumentation Site 17, is 110 nm. It appears that these 4 sites would provide very good coverage of the GALOSH flight.

25X1

Construction activity started on the E-shaped buildings in the summer and fall [redacted] construction of the buildings appeared complete, but activity was still taking place as indicated by a cluttered appearance. The facilities appeared to be usable by the fall of 1964.

25X1D

It is also interesting to note that this flight path would pass within a ground range of approximately 3 nm from Instrumentation Site 6. The Soviet video tape showed some of the equipment that is believed to

*Estimated for a maximum acceleration condition only.

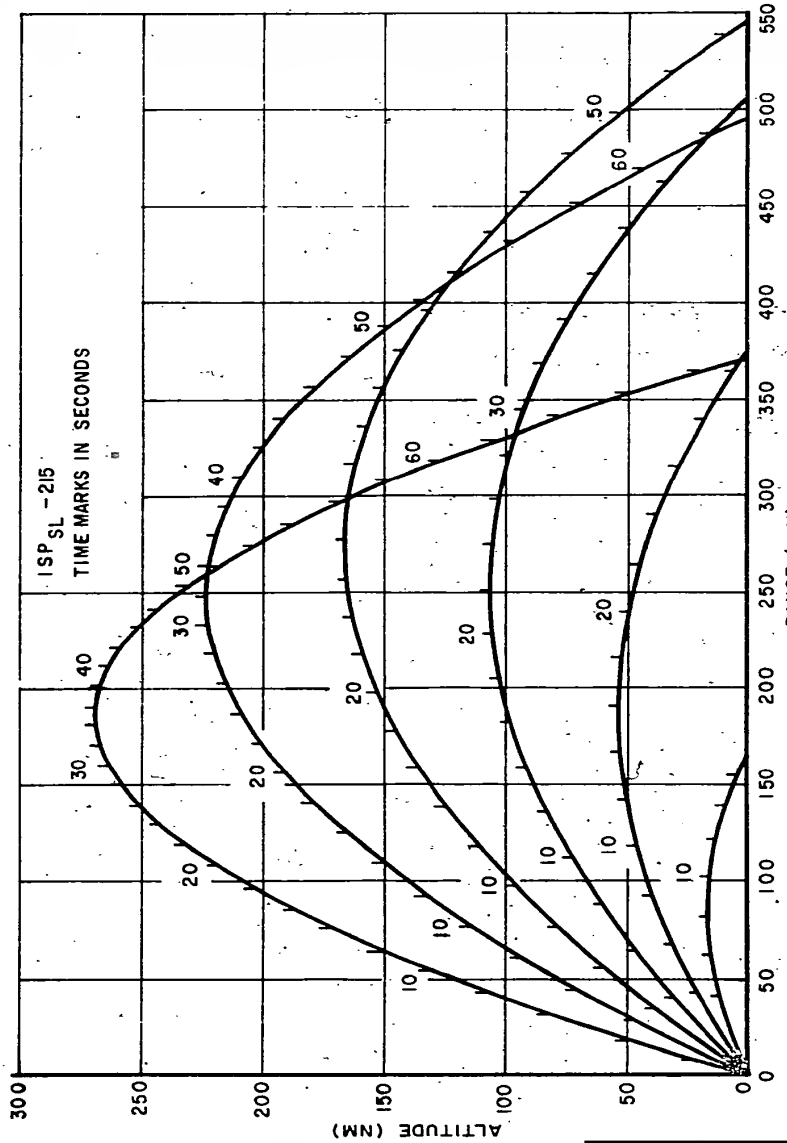

FIGURE 20. FLYOUT ENVELOPE OF GALOSH MISSILE

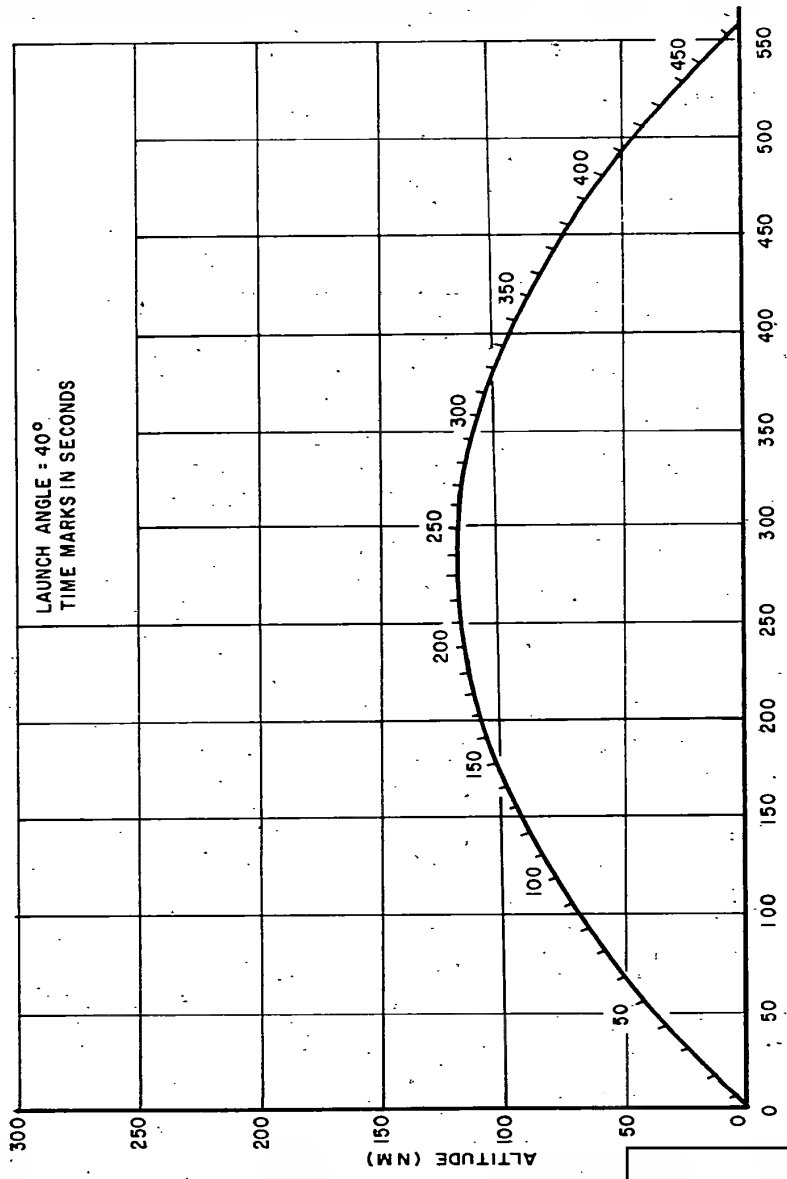

FIGURE 21. FLYOUT ENVELOPE OF GALOSH MISSILE: ISP 260 SECONDS (VACUUM)

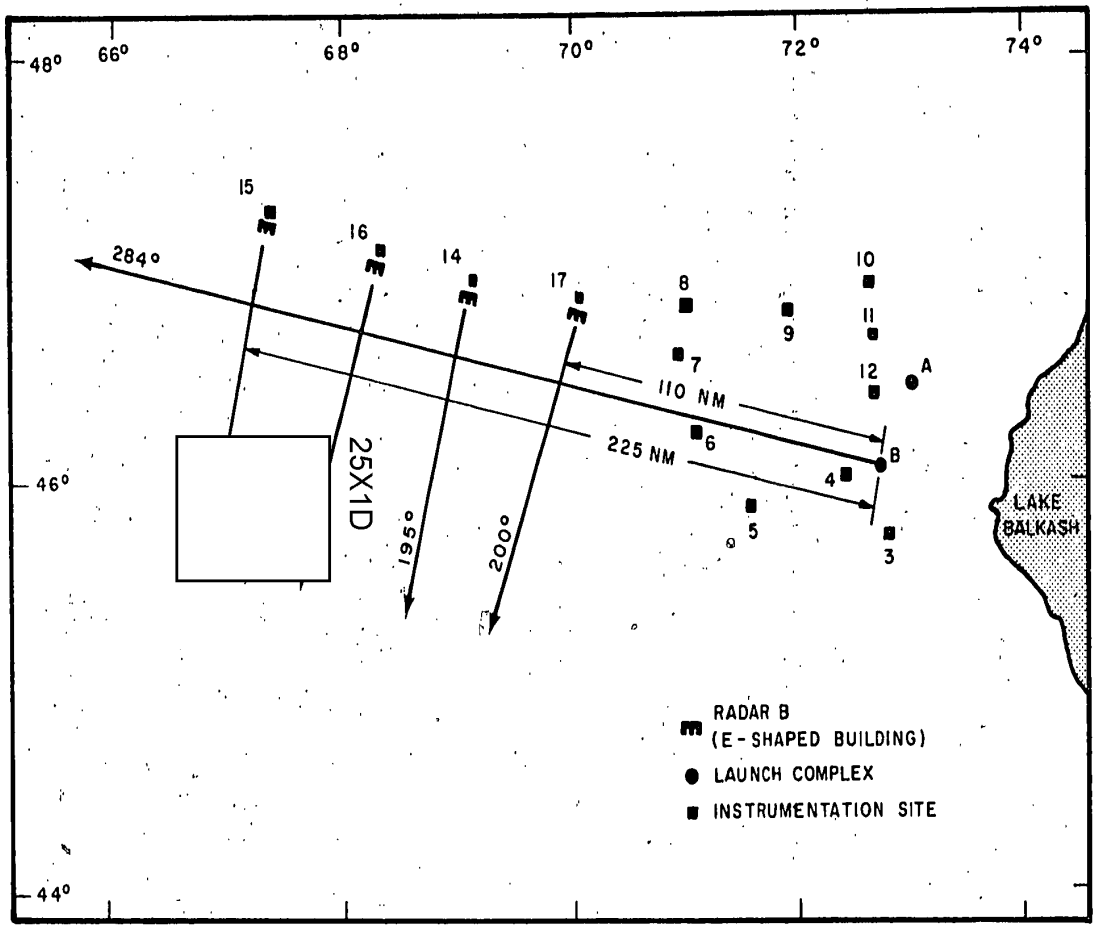

FIGURE 22. ORIENTATION OF INSTRUMENTATION SITES 14, 15, 16 AND 17 AT SSATC

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be at Instrumentation Site 6, including what appeared to be a radome designed for high angle or overhead tracking. This piece of equipment at Instrumentation Site 6 would be able to track a missile flown from Launch Complex B on the previously mentioned azimuth of [redacted] 25X1D

b. Makat Launch Activity

Communications between the field launch site at Makat and Sary Shagan reflected target missile launches between [redacted] 25X1D 25X1 [redacted] Early photographic coverage of Makat ([redacted] was too infrequent and failed to provide good detailed coverage that was needed to correlate activity in this area with [redacted] reflected firings. Coverage of the Makat area in late [redacted] revealed activity in the launch area that was followed by firings that resumed in early [redacted] (Figure 23). No coverage of the Makat area was obtained during the remainder of the [redacted] reflected Makat firings; however, several coverages subsequent to the most recent [redacted] reflected firings in [redacted] revealed activity at Makat. 25X1D 25X1D 25X1D 25X1D

High resolution coverage of the Makat facilities on [redacted] provided good detail of the entire area. The launch facilities are almost identical to the SS-4 field launch sites observed in Cuba in 1962. The launch site (48°02'N,53°41'E) is located 6.7 nm northwest of the FLIM FLAM site and is connected by road to the support area and the airfield near the FLIM FLAM site. Missiles are probably off-loaded at a secured rail transloading area at Zhamansor and brought by road to the main support area. From the support area the missiles are probably taken by road to the launch facilities that include a missile checkout area containing a missile checkout tent (identical to those seen in Cuba), a nearby warhead storage building (similar to those observed under construction in Cuba in 1962), and two other areas that are probably used for support and instrumentation.

25X1D After obtaining the high resolution coverage, previous coverages were reviewed. It is now apparent that the Makat launch facilities were active on [redacted] and the main support base was active on [redacted] although there was no activity in the launch area. The main support base was also active on [redacted] however, no coverage was obtained of the launch facilities on this date. Since the last [redacted] reflected firing in March 1964, only four launches have been detected [redacted] Based upon the activity observed in photographic coverage, it is believed that target missile firings continued throughout the last half of 1964 and that more than the four detected firings have occurred in 1965. 25X1D 25X1

B. Defensive-Related Activities

The video tape released by the Soviets in May 1965 contained a possible launch of the GALOSH missile. The only identifiable object other than the missile container was a tower of lattice construction topped with a square platform. The camera angle was such that the erector mechanism was not visible.

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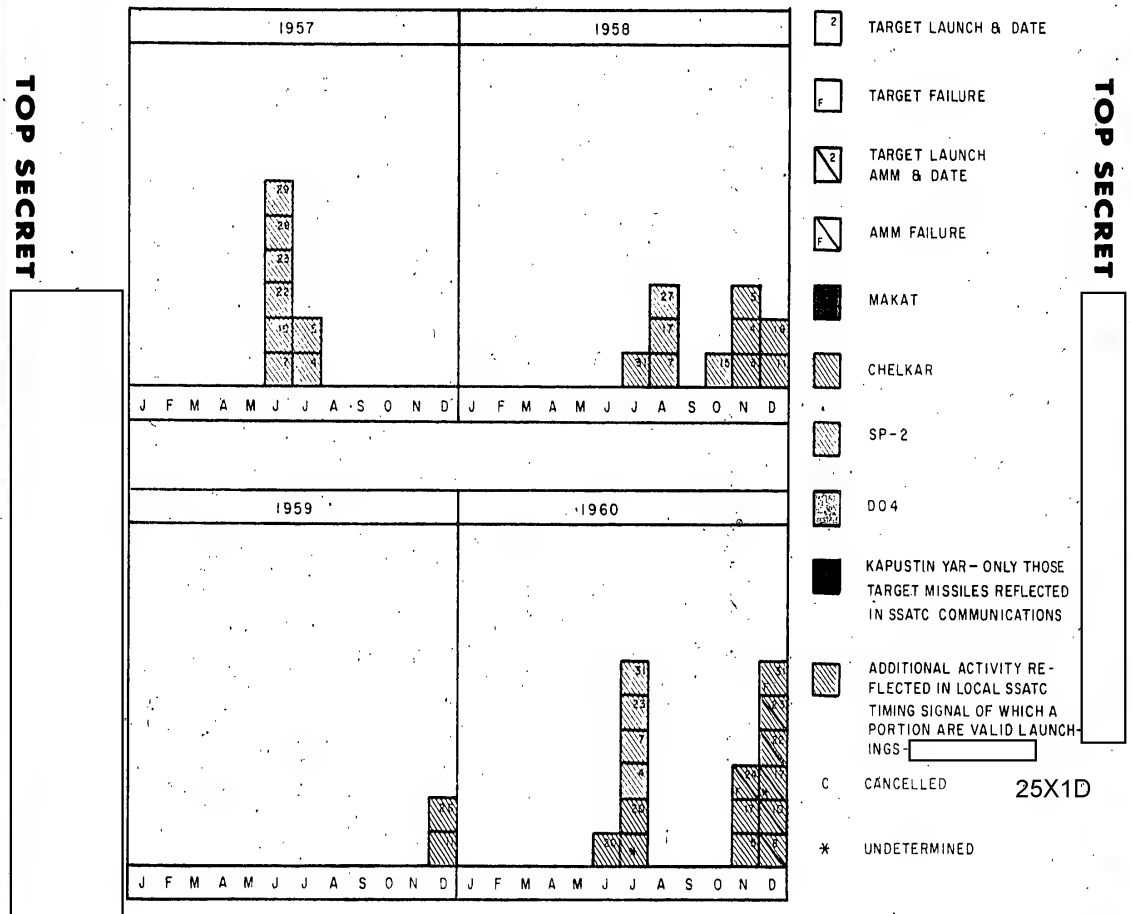

25X1D

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25X9

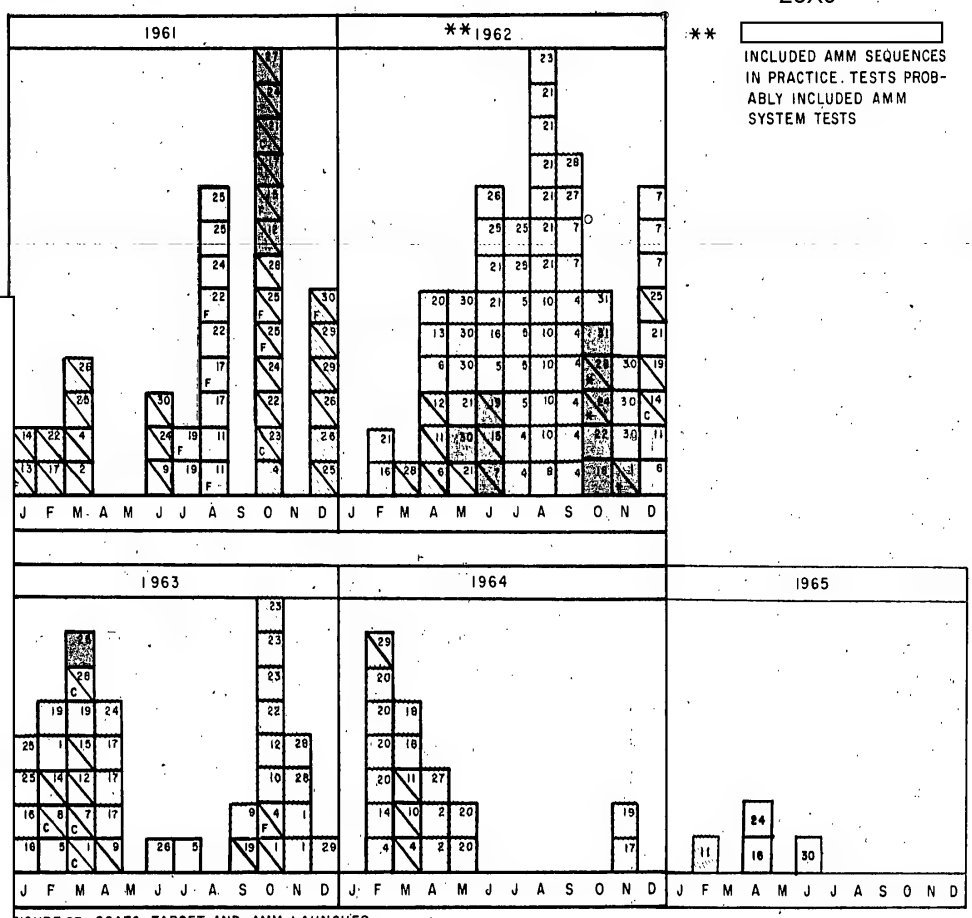

FIGURE 23. SSATC TARGET AND AMM LAUNCHES

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The shape of the tower and its relative closeness to the launch position eliminated all known launch areas except Complex B, SSATC. Both loop roads at Complex B have towers that appear similar to the one in the filmed sequence. Based on the geometric layout of the area, it would be possible to place a camera in such a position to exclude all but one of the towers as shown in the film.

25X1D

On the photographic coverage obtained on [redacted]
25X1D a long dark object was visible on the loop road and appears to resemble the GALOSH canister and prime mover; however, it is not possible to make a positive identification. This object, [redacted] had been removed before
25X1D [redacted] At the present time Launch Complex B, SSATC, remains the best candidate for the GALOSH test activity.

The location of a new type antenna having a spherical shape that was observed in the Soviet video tape, has been identified as Instrumentation Site 6, SSATC, based upon the facility consisting of a large (110') dome and a smaller dome separated by a building and a third uniquely configured dome (new type antenna). The new antenna dome measures 50' in diameter, and is supported by a large yoke structure that appears to have an East-West orientation. Movement of the yoke in the supporting base structure by a rack and pinion drive would permit the rotation of the sphere $\pm$ 90° about an axis parallel to the earth's surface. Pivots at the ends of the yoke permit rotation of the sphere $\pm$ 90° about an orthogonal axis. The sphere appears to have embedded in its surface a reflecting dish antenna, approximately 35' in diameter, that looks overhead when the two rotational axes are parallel to the earth's surface. This mechanism, therefore, is believed to have been designed for tracking overhead targets.

Four probable waveguides were observed on each axis of the antenna. The best estimates from scalings suggest that the operating frequency is probably between 0.9 and 1.2 KMC. Two large vanes attached to the yoke could possibly perform a wind-loading or counterbalancing function.

A brief analysis suggests that this antenna is a monopulse/target tracking radar with possibly a single 2°, 38 db beam for transmitting and four similar beams, properly offset in angle, for monopulse reception.

25X1D

A three-dish radar, consisting of two FIREWHEEL dishes [redacted] and a smaller dish mounted on a single pedestal, was also shown in the film. The top dish feed appeared to be identical to that of a FIREWHEEL feed, but the feed for the bottom dish was not visible. These two dishes may be used in a [redacted] role as a missile tracker array and the small dish could possibly serve some command function.

25X9

A [redacted] parabolic dish antenna associated with what appeared to be a large air-inflated radome was shown in a film sequence that showed a man climbing up a flight of stairs alongside a massive concrete pedestal mount. On top of this mount was a bi-axis pedestal that would probably permit the antenna to track at high elevation angles. An analysis made of the photography of SSATC has revealed that this radar has a probable frequency range of 1.2 to 1.6 KMC, and a half-power beamwidth of [redacted]

The HEN ROOST North (receiver) at SSATC was also shown in the film. It appears that the antenna structure consists of two offset fed parabolic cylinders, one cylinder being mounted above and slightly to the rear of the other. The upper antenna is tilted back to face higher elevation angles.

III. OFFENSIVE MISSILE SYSTEMS

A. Tyuratam Missile Test Range (TTMTR) Research and Development Facilities.

25X1D

25X1D The rangehead area was almost entirely covered [redacted] 25X1D
[redacted] and was partially covered by [redacted]
25X1D [redacted]. Of the additional facilities noted in this area, the most significant were a possible new launch facility (A4) at Complex A, another launch pad (J2) at Complex J in the initial stage of construction, and the L-group of launchers (see MK-1-65) that has been expanded to 10 launch silos.

1. Complex A (Figure 24)

There were no significant changes noted at pads A1 and A2. Launch Site A3 appears to be almost complete, but several pieces of equipment in the area indicate that the facility is not yet ready for use. The silo door is open and appears to be identical to those at Complex I and B2, as well as those at the type IIIA sites. A possible new launch pad (A4), approximately 400' east of pad A2, appears to be a rectangular, rail-served, concrete pad. The purpose of this new pad is not presently known nor can the unusual arrangement of the rail lines associated with the pad be explained.

2. Complex B

The silo door was open at B2 and the launch area appears to be completed. Launch Area B3 is confirmed as a soft pad with a launch stand in the center. This facility may have been used for the triple satellite launchings in the fall of 1964 and the spring of 1965. No significant changes were noted at pad B1.

3. Complex C

Only a portion of the complex was covered. Two RIM buildings are under construction approximately 1 nm west of pad C1.

Several fuel/oxidizer trailers, vehicles, and other equipment that were seen in the area were probably used in conjunction with the SS-7 firings of [redacted] these are believed to have been troop training firings. 25X1D

4. Complexes D, E and F

There was no coverage of Complexes D and E, and only non-stereo photography of Launch Complex F.

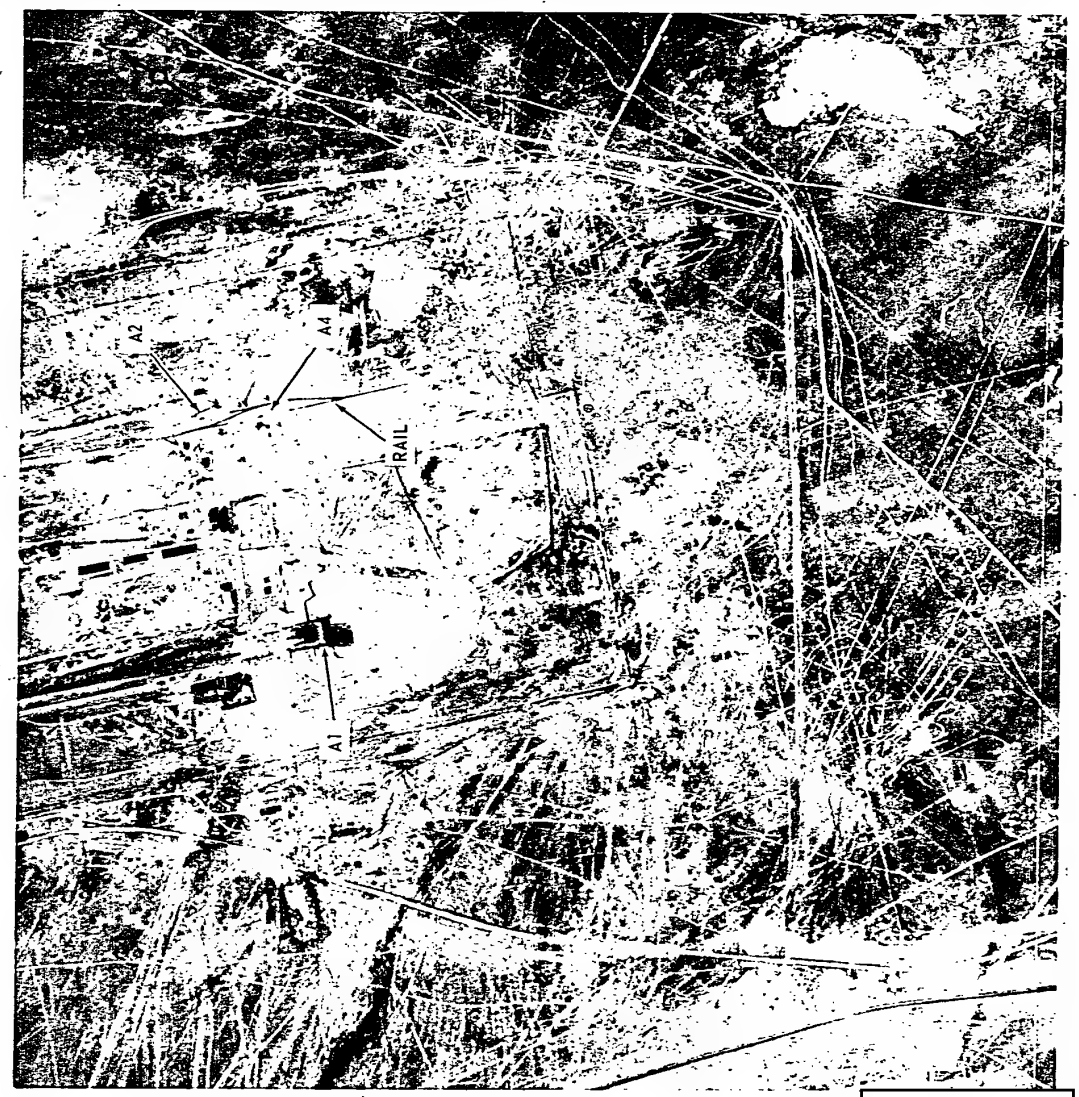

FIGURE 24 LAUNCH COMPLEX A, TYURATAM MISSILE TEST CENTER

5. Complex G

Complex G was covered by good quality stereo photography.

a. Launch Area G1 - G2. (Figure 25)

An erected missile, approximately 95' long, on pad G2, which has been previously associated with the SS-10, may be an indication of the size of the SS-10. Since no ICBM launchings have been detected since the date of photography, this missile probably has not been fired.

b. Launch Area G3 - G4. (Figure 26)

The gantry on pad G4 appears to contain a cylindrical object about 80' high with three light-toned cylindrical objects, approximately 25' high, at its base. The 25' objects look like tanks strapped around the higher cylinder and all are believed to be missile components. Apparently a missile is being assembled in the gantry, but in its present state this assembly does not resemble the [redacted] long missile seen previously at this pad. 25X1D

c. Launch Areas G5 - G6 and G8 - G9. (Figures 27 and 28)

The gantry was on pad G5, and a piece of equipment about 75' long, possibly a missile trailer, was parked on the pad. A cylindrical object, approximately 60' long, was erected on pad G6 and was supported by braces at its mid-point. A probable missile transporter (tractor and trailer), approximately 95' in overall length, was located about 500' southeast of pad G6 and may have been moving at the time of photography. The object erected on G6 is not a complete missile and may not even be a missile component. Although this object could be a section of missile tankage, it also resembles a canister or container of some type. A similar object on a transporter at pad G9 appears to be of a single diameter.

It has been suggested that G5 - G6, and G8 - G9 are launch facilities for a Minuteman-size solid propellant ICBM. The three-stage solid ICBM seen in the 9 May parade in Moscow is of that size and the dimensions of the transporters at the range seem to fit this system. If the 60' long object seen at the range is an environmental container for a solid propellant ICBM, this dimension would also fit.

The activity, equipment and vehicles in the area indicate that G8 - G9 are in an operational status, both silo doors being open on the date of photography. G5 and G6 were reported as complete in MK-1-65.

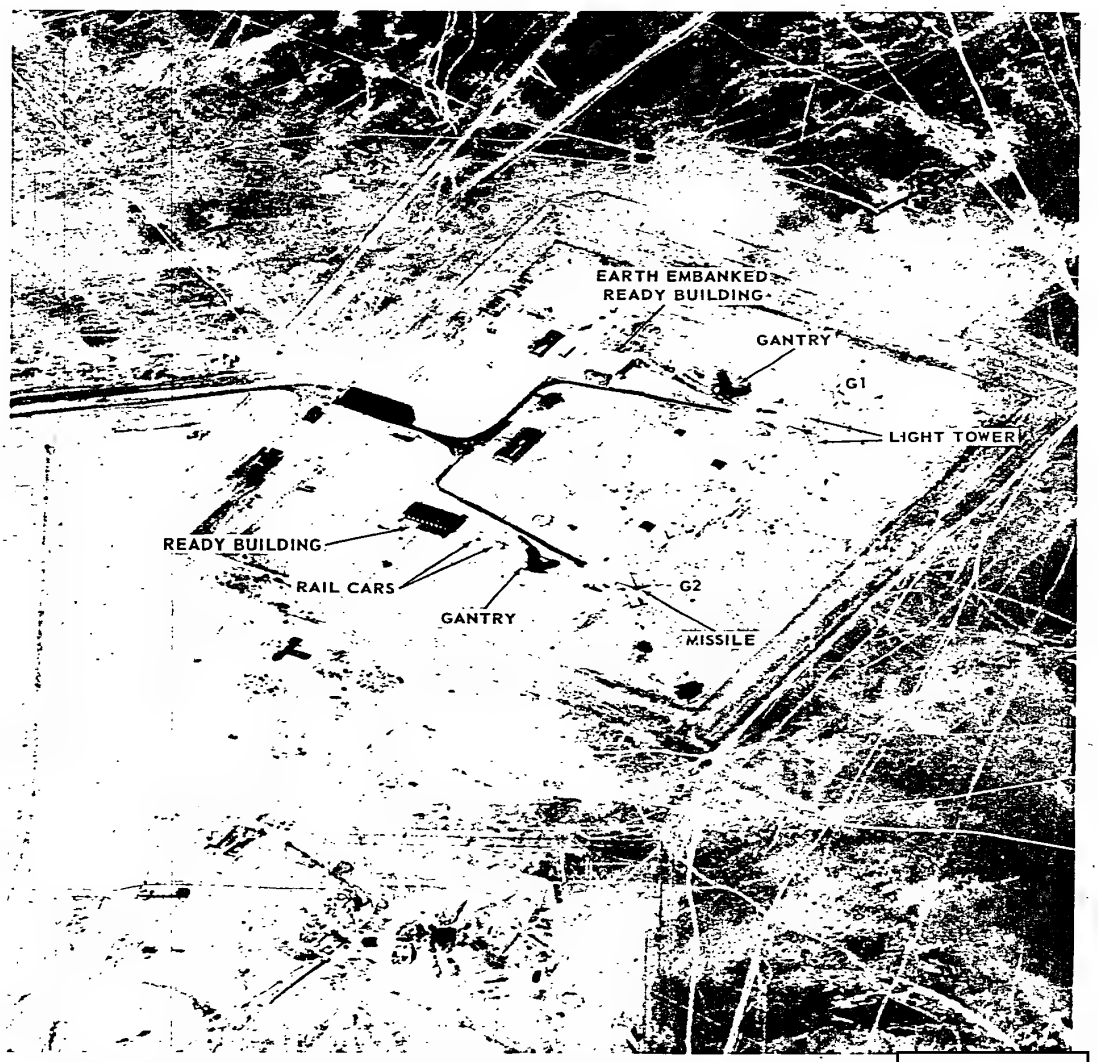

FIGURE 25. LAUNCH AREA G1 - G2, TYURATAM MISSILE TEST CENTER

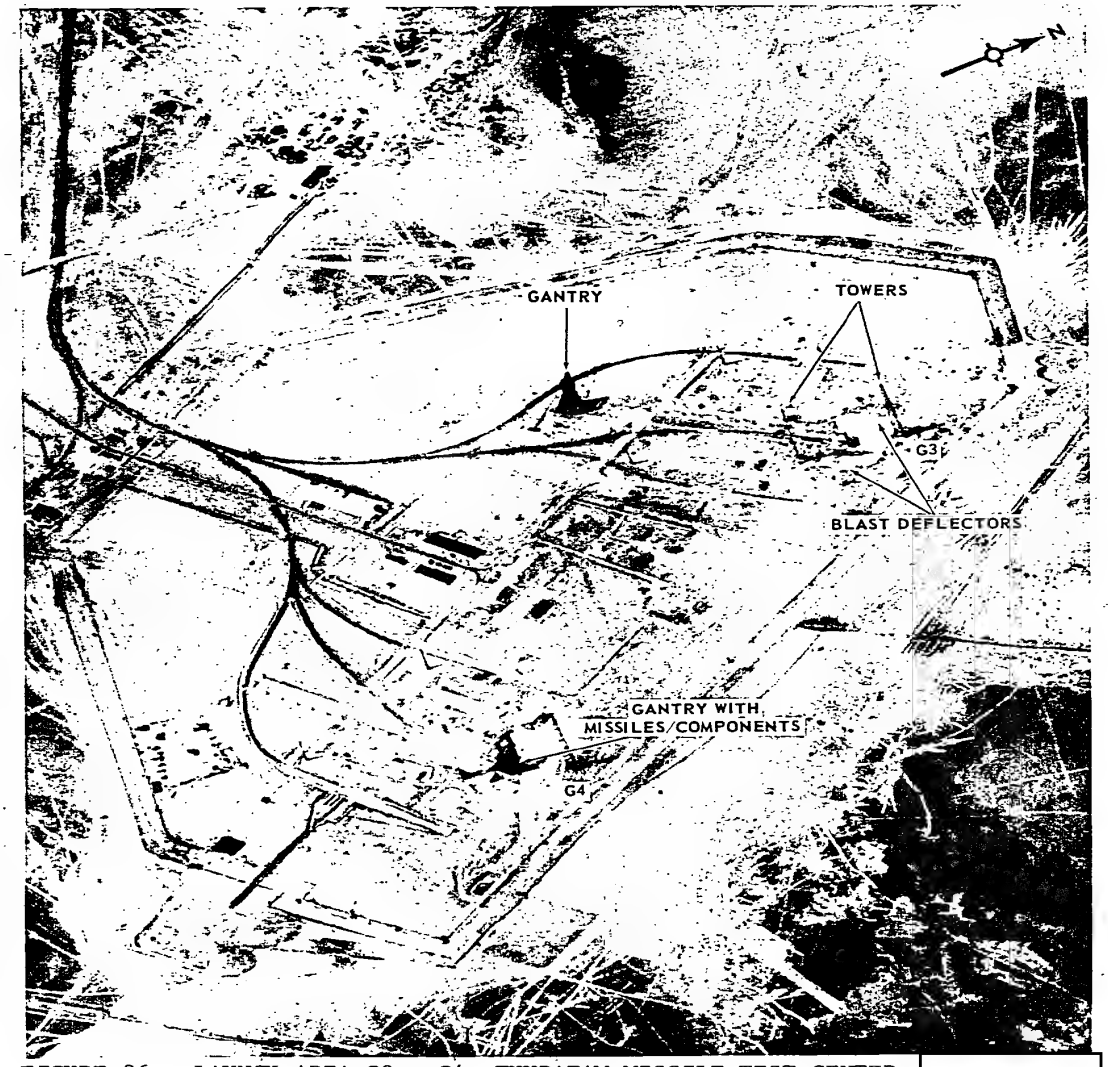

FIGURE 26. LAUNCH AREA G3 - G4, TYURATAM MISSILE TEST CENTER

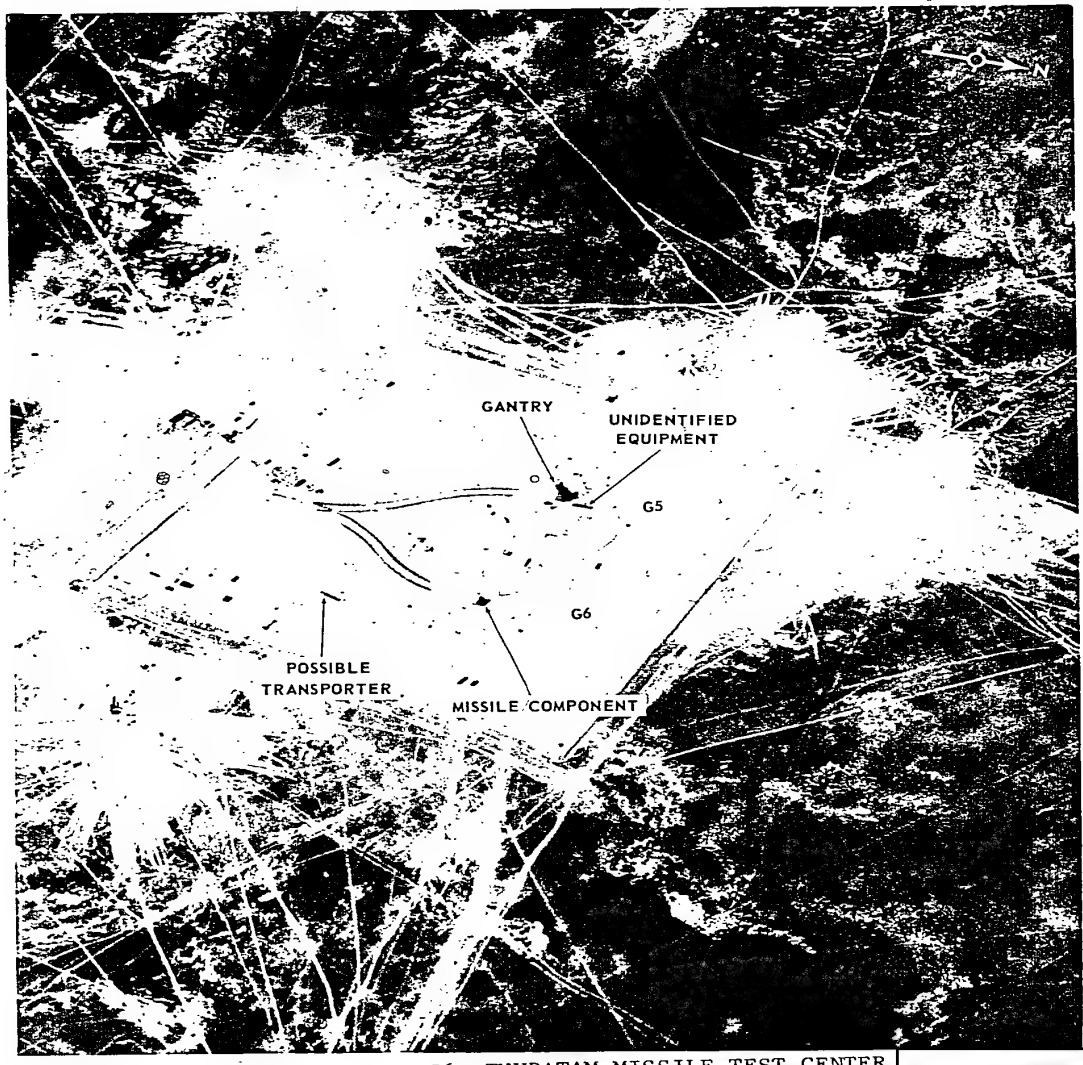

FIGURE 27. LAUNCH AREA G5 - G6, TYURATAM MISSILE TEST CENTER

FIGURE 28. LAUNCH AREA G8 - G9, TYURATAM MISSILE TEST CENTER

FIGURE 29. LAUNCH COMPLEX J, TYURATAM MISSILE TEST CENTER

d. Launch Area G7

The silo is not yet up to ground level. Small silos are located at the extremities and intersection of the legs of the electronic facility, indicating hardening of the installation.

6. Complex I

The silo is probably complete, but the surrounding area does not have a clean, finished appearance. Small silos that are similar to those at G7 appear to be located at the extremities and intersection of the legs of the L-shaped electronic facility.

7. Complex J (Figure 29)

The large assembly/checkout building appears to be complete. Two parallel scars, possibly gantry tracks under construction, are approximately 60' apart and extend some 3,000' from the building in the direction of the large excavations. A second large excavation, probably a pit for a launch pad, is being dug approximately 1700' west of the original pit. The rail line has been extended and divides into a Y configuration; it terminates between the two excavations. The eastern excavation is designated J1 and the western excavation J2. As mentioned earlier, the complex is probably being build for development of large space vehicles.

8. Complex K

Construction continues at launch area K1 - K2 and neither silo is yet up to ground level. The control bunker at K3 has been re-backfilled and the electronic facility appears complete.

9. Launch Group L.

All launch sites are double fenced and have mounded earth-level accesses to the silo. A control bunker is under construction at L1, adjacent to the L-shaped electronic facility. Small silos are under construction at the extremities and intersection of the legs of the electronic facility.

B. Kapustin Yar Missile Test Range (KYMTR) Research and Development Facilities

25X1D

[redacted] provided good quality coverage of all the surface-to-surface missile facilities at the test range and revealed several missile exercises but not any major new developments. The following is a brief description of the activity at each of the areas:

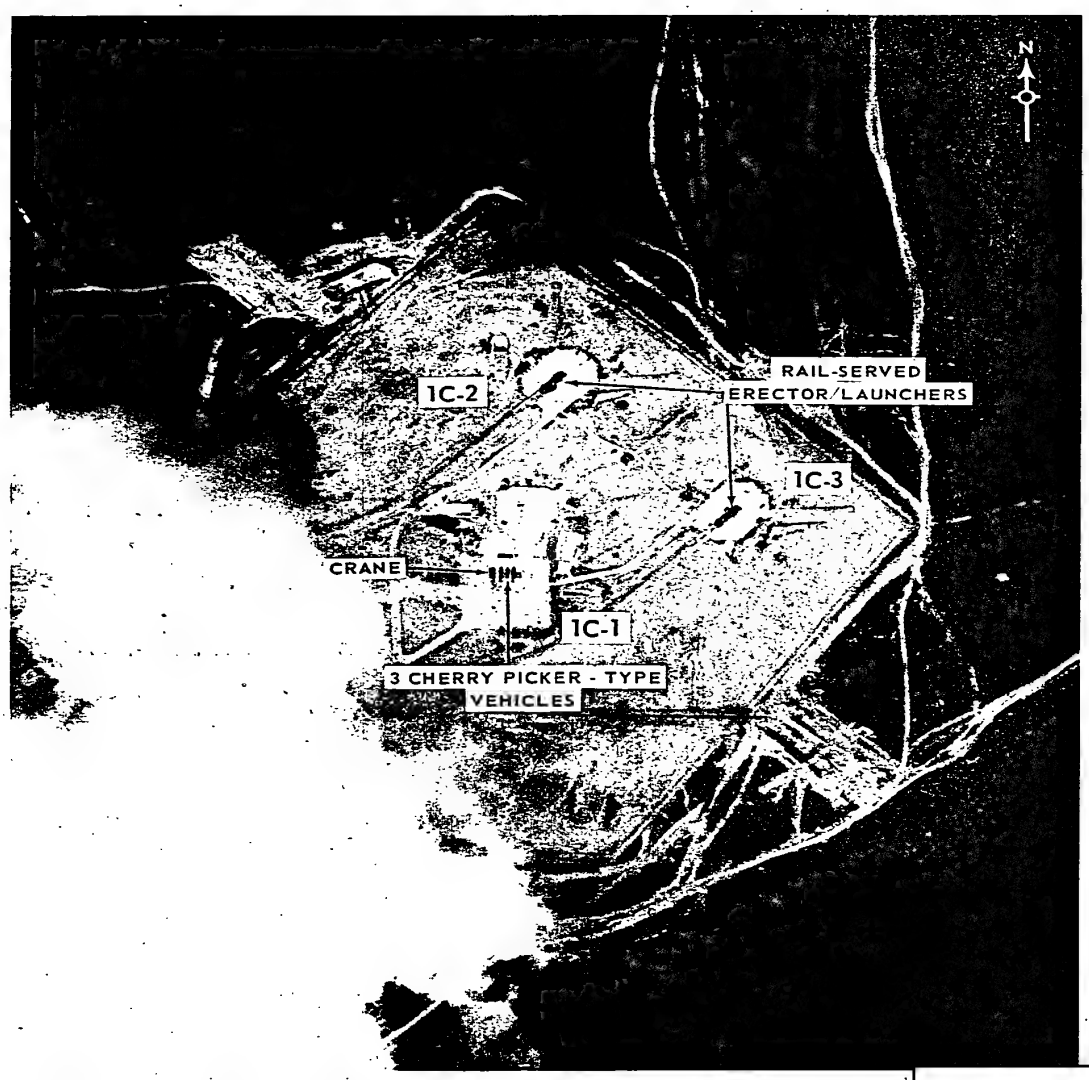

FIGURE 30. LAUNCH AREA 1C, KAPUSTIN YAR/VLADIMIROVKA MISSILE TEST CENTER

1. Launch Area A: There was no missile activity identified in this area; however, several vehicles were identified around the Northern Ramp which is believed to be a naval-related facility.

2. Launch Complex B: There was a high level of activity throughout this area, but no activity could be identified in the cruise missile training area behind the complex. There were several missile-like objects in the support area, but none could be identified as to specific type. Thus far, there has been only one cruise missile launch to Kapustin Yar this year.

3. Launch Complex C: Launch Area 1C, consisting of two rail-served launch pads, is now complete and usable (Figure 30). The launchers on the two new pads resemble the one previously located on the old launch pad, which has apparently been abandoned. The purpose of this area is not clear, but could be related to an expansion in the COSMOS satellite program. An SS-4 training exercise was underway at the south pad in Launch Area 2C while modifications were being made to the north pad in this area (Figure 31). Vehicles/pieces of equipment indentified at the south pad were:

- SS-4 missile on transporter
  Erector in position
  Power convertor
  Generator
  Theodolite position
  Cables
  2 oxidizer trucks with prime movers
  1 fuel transporter with prime mover
  11 checkout vans and cargo trucks

The vehicles at this launch pad were positioned in practically the same way as those of an SS-4 launch site that was identified in Cuba in 1962.

No activity was noted in Launch Area 3C, but two empty missile transporters were located on the south dumbbell. Also, there was no significant activity noted at area 4C, but several missiles and associated pieces of equipment were noted in that area.

An SS-5 training exercise was noted at the north pad in area 5C-1 (Figure 32). In addition to the missile erector, there were two SS-5 fuel transporters, two possible oxidizer transporters, and several other vehicles. This was probably a dry fire exercise since the missile was in a reverse position on the pad. There have been no changes in the condition of Launch Area 5C-2, which is apparently abandoned.

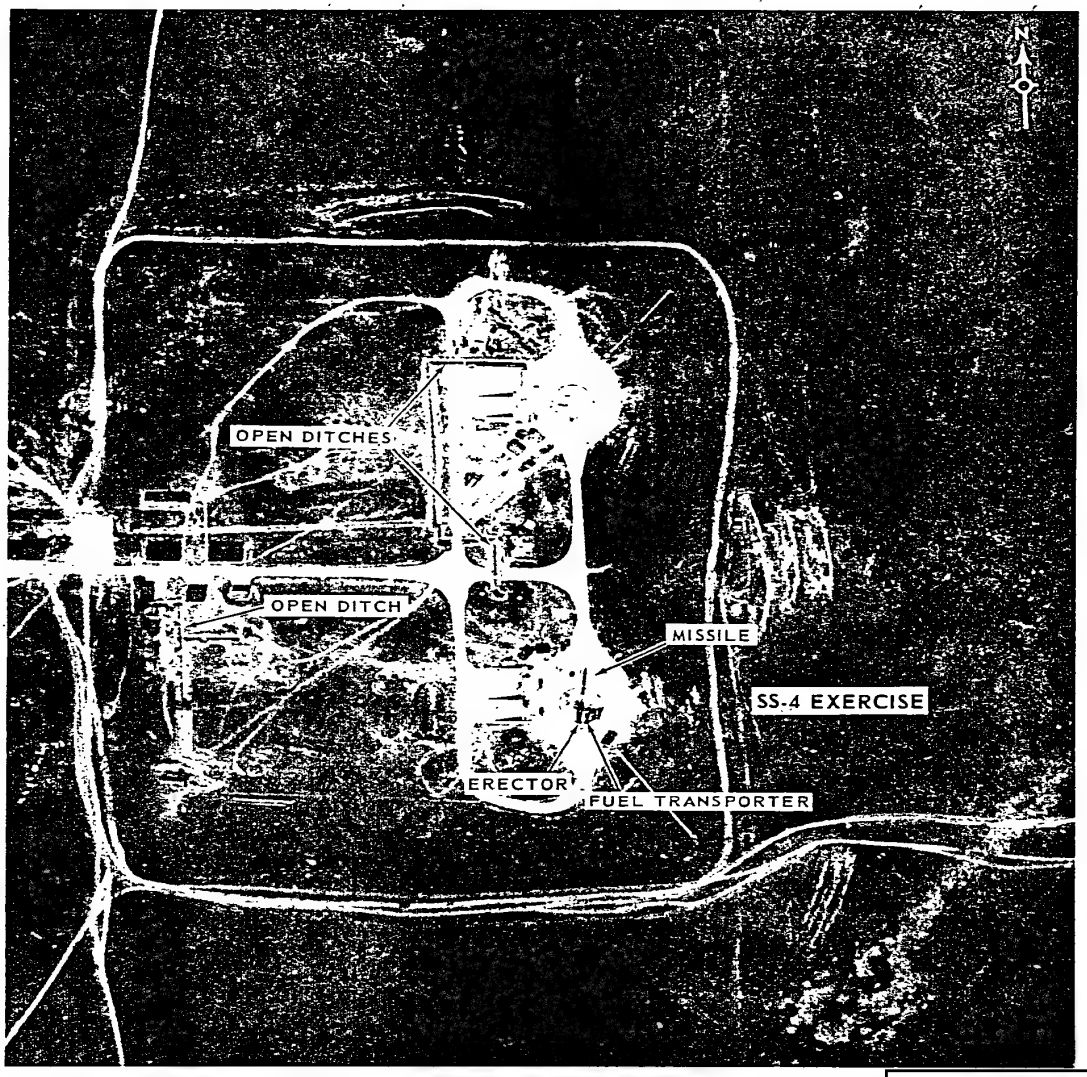

FIGURE 31. LAUNCH SITE 2C, KAPUSTIN YAR/VLADIMIROVKA MISSILE TEST CENTER

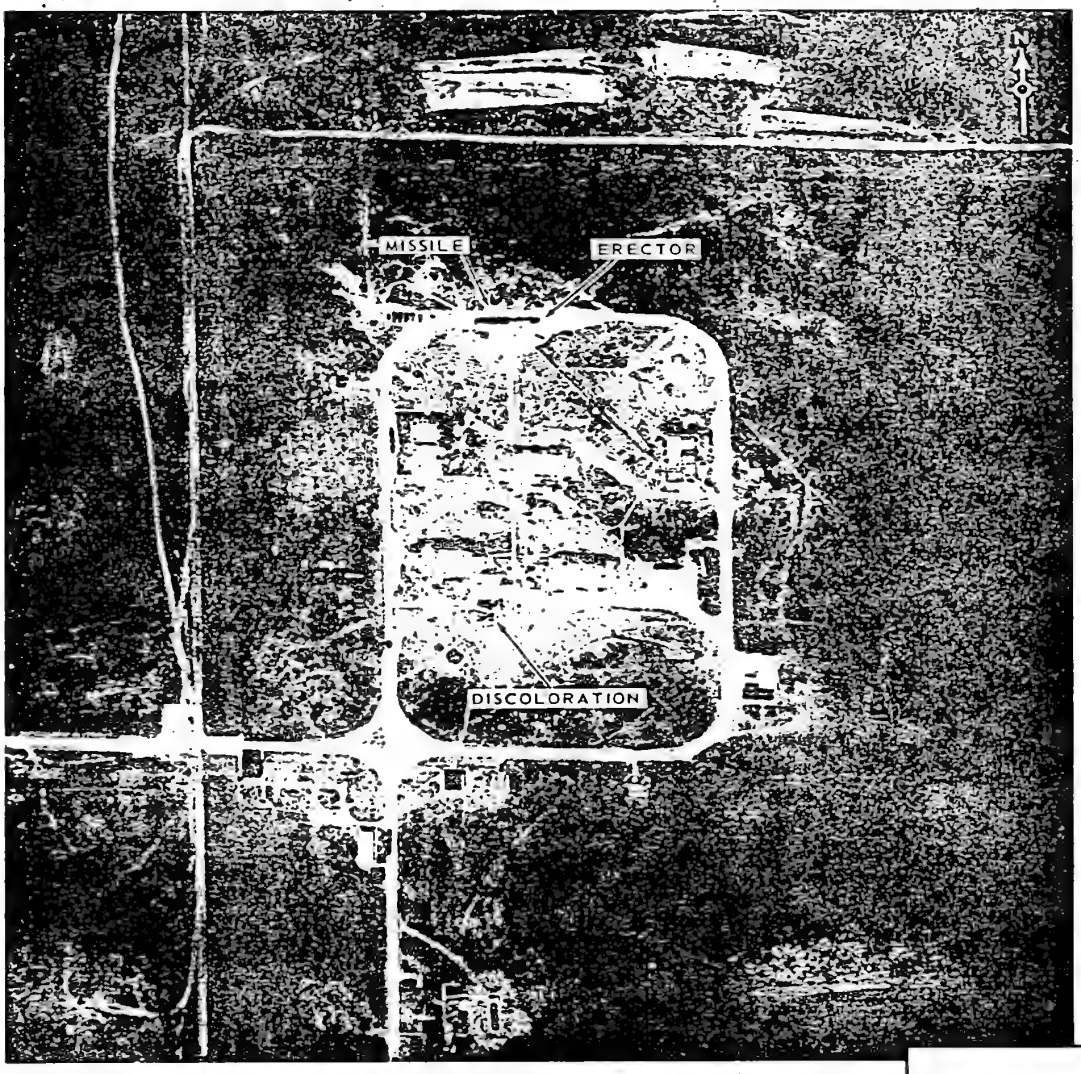

FIGURE 32. LAUNCH SITE 5C-1, KAPUSTIN YAR/VLADIMIROVKA MISSILE TEST CENTER

FIGURE 33. LAUNCH AREA, EMBA MISSILE TEST CENTER

4. Launch Complex E: A few vehicles were located in the launch area, but no missile activity could be identified.

5. Launch Complex G: [redacted] represents the first [redacted] of this facility. From an analysis of the area it is believed that this facility was never completed. The roads do not appear to have been used nor were there any vehicle tracks around the launch pads. This area appears to be completely inactive and may never have been used. It has been assessed as the SS-2 training area and the last SS-2 launch was in 1961.

6. Launch Complex H: This area is still under construction but should be completed in a few weeks. The launch pads are only about 435' apart which suggests that a small weapon will be fired from this area when completed.

7. Tactical Rocket Forces Training Area: Limited training activity was identified at this area, with three SCUD units being noted. A motor pool near the barracks area contained about 45 vehicles, three of which are believed to be SHADDOCK transporters. There were three separate field training exercises noted involving SCUD missiles. Two of these units were located in the area behind Launch Complex E, and the other unit was located near the barracks area at Launch Complex A. The unit at Complex A contained two TEL's, one A-frame crane, two semitrailer transporters and approximately 27 additional vehicles. Both units behind Complex E were approximately the same size; each had a sufficient number of tents to house approximately 450 to 500 men and the field kitchen could be identified at each area. A meteorological radar (END TRAY) was associated with each unit. A transloading exercise was underway in one of the areas.

C. Emba Missile Test Range

The Emba Missile Test Range was photographed on [redacted]; this coverage included all facilities between the launch area and Support Area A (Figure 33). Some highlights of this photography were:

The launch area was active and contained objects in the center of each launch pad which, from their size and configuration, could have been missile transporter-erector-launchers. The current assessment of the launch area is that it continues to be active, but a particular missile system cannot be associated with the installation. The objects identified on [redacted] appear to have a different configuration than the one identified on [redacted] Some construction is underway in the launch area.

The area just east of the launch area contains one drive-through building having small entrances, which correlates very well with the identification of small missiles being tested at Emba.

Numerous aircraft, including BEAGLES and FAGOT/FRESCO's, were identified at the airfield. The BEAGLE and FAGOT/FRESCO's may not be operational, but may have been parked in the area for camouflage and deception since aircraft of this type have been seen under similar circumstances at storage, MRBM deployed sites

25X9

In summary, the Emba test range continues to be active and missile testing is continuing. It appears that more than one type of missile is being tested at Emba, but a specific type of missile system cannot be identified.

IV. CHINESE COMMUNIST MISSILE PROGRAM

A. Summary

Chinese Communist missile highlights during the last three months included the discovery of a probable two-pad coastal defense cruise missile launch complex near Yen-t'ai on the Shantung Peninsula, and the identification of two more SAM sites at Lanchow, one at Pao-t'ou and two at the Shuang-ch'eng-tzu Missile Test Center (SCTMTC) rangehead. In addition, [redacted] revealed a probable missile exercise underway at the south pad of SSM Launch Complex A; and [redacted] showed at least 10 vehicles or pieces of equipment parked at the motor pool of the SSM/SAM Assembly and Checkout Area -- thus tending to confirm the probability that SAM operations at the rangehead are moving into a more active phase, as noted in MSS 21-65. Figure 34 shows place locations.

25X1D 25X1D 25X1D 25X1D 25X1D

B. Cruise Missile Launch Complex at Yen-t'ai

25X1D [redacted] revealed a probable two-pad coastal defense cruise missile launch complex 4 nm north of Yen-t'ai, at 37° 37'N, 121° 23'E. The launch facilities resemble those of the two-pad complex near Port Arthur, on the opposite side of the Po-hai Straits.

The Yen-t'ai complex consists of two probably-revetted, unoccupied launch positions and four missile hold positions. A possible missile storage area lies 2 nm west of the launch positions, and an adjacent probable support facility has about 10 buildings and an open storage area.

If the Chinese deploy a 35 nm cruise missile system to both the Yen-t'ai and Port Arthur complexes, their range envelopes would nearly meet in an area slightly east of the center of the Po-hai Straits.

C. Additional SAM Sites in China

The discovery of five more SA-2-type SAM sites in China during the past three months brings the total of possible tactical sites to 17* with at least four of these 17 possibly or probably occupied. Two of the five additional sites are at Lanchow: Sites B 29-2 (36° 08' 30"N, 103° 22' 45"E) and E 14-2 (35° 29' 45"N, 104° 24' 25"E). Of the remaining three, one is at Pao-t'ou (A 02-2;

*There are at least 10 other SAM-associated sites in China, including 2 R&D sites, 3 currently or formerly associated with training, and 5 former tactical sites now probably abandoned. As of [redacted] 25X1D SAM-associated sites have been noted in China.

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25X

FIGURE 34. MISSILE RELATED LOCATIONS IN COMMUNIST CHINA

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40° 45' 20"N, 110° 04' 30"E) and the other two (40° 44' 30"N, 100° 03' 10"E and 40° 44' 30"N, 100° 03' 00"E), are at the SCTMTC rangehead, about 8,000 feet south and 15.6 nm south respectively, from the SAM R&D Launch Complex (41° 02' 38"N, 100° 31' 10"E).

Pao-t'ou Site A 02-2 is of particular interest in that the [redacted] coverage is of sufficient resolution to permit a detailed study of the facilities. [redacted] 25X1D

25X1D [redacted] revealed four fenced-in launch areas, and within each, a launcher and transporter with missile. Four missiles were in the launch areas and one was in a missile hold area; possibly three more were in a support area, and possibly one was in a tent area north of the site. There were 46 small tents and 3 large tents were in the vicinity, and a guidance area was occupied by a probable FAN SONG-type radar, 4 vehicles and 7 vans. [redacted] showed that two new launch 25X1D positions had been added to the site since [redacted] The positioning of loaded transporters inside the fenced-in launch areas would reduce the reaction time of this SA-2-type site as compared to its Soviet SA-2 counterpart. 25X1D

D SCTMTC Rangehead Activities

25X1D [redacted] showed a probable missile exercise underway at SSM Launch Complex A, Site No. 1; however, clouds and haze obscurred details. [redacted] flurry 25X1D of [redacted] supported air activity at Shuang-ch'eng-tzu airfield ("Point 14") may have been related to this probable exercise. The 25X1D air activity involved a probable IL-14 landing at "Point 14" on 25X1D [redacted] the flight of probably the same aircraft from "Point 14" to Wu-kung via Wu-wei on [redacted] and its return to "Point 14" on 25X1D [redacted] and two departures (one of them possibly involving the same 25X1D aircraft) from possibly "Point 14" for Ha-mi on [redacted]

The Ha-mi flights suggest the possible involvement of the Wu-shih-t'a-la airfield ("Point 03") in the above "Point 14" activity, particularly in view of the flight of two AN-2 aircraft from Urumchi (Wu-lu-mu-ch'i) to "Point 03" on [redacted] Although the complete 25X1D role of the "Point 03" airfield remains unknown, it is suspected that in addition to its involvement in support activities to the Lop Nor nuclear test center, it may also be supporting SCTMTC impact/instrumentation facilities in the approximate 650 nm downrange area.

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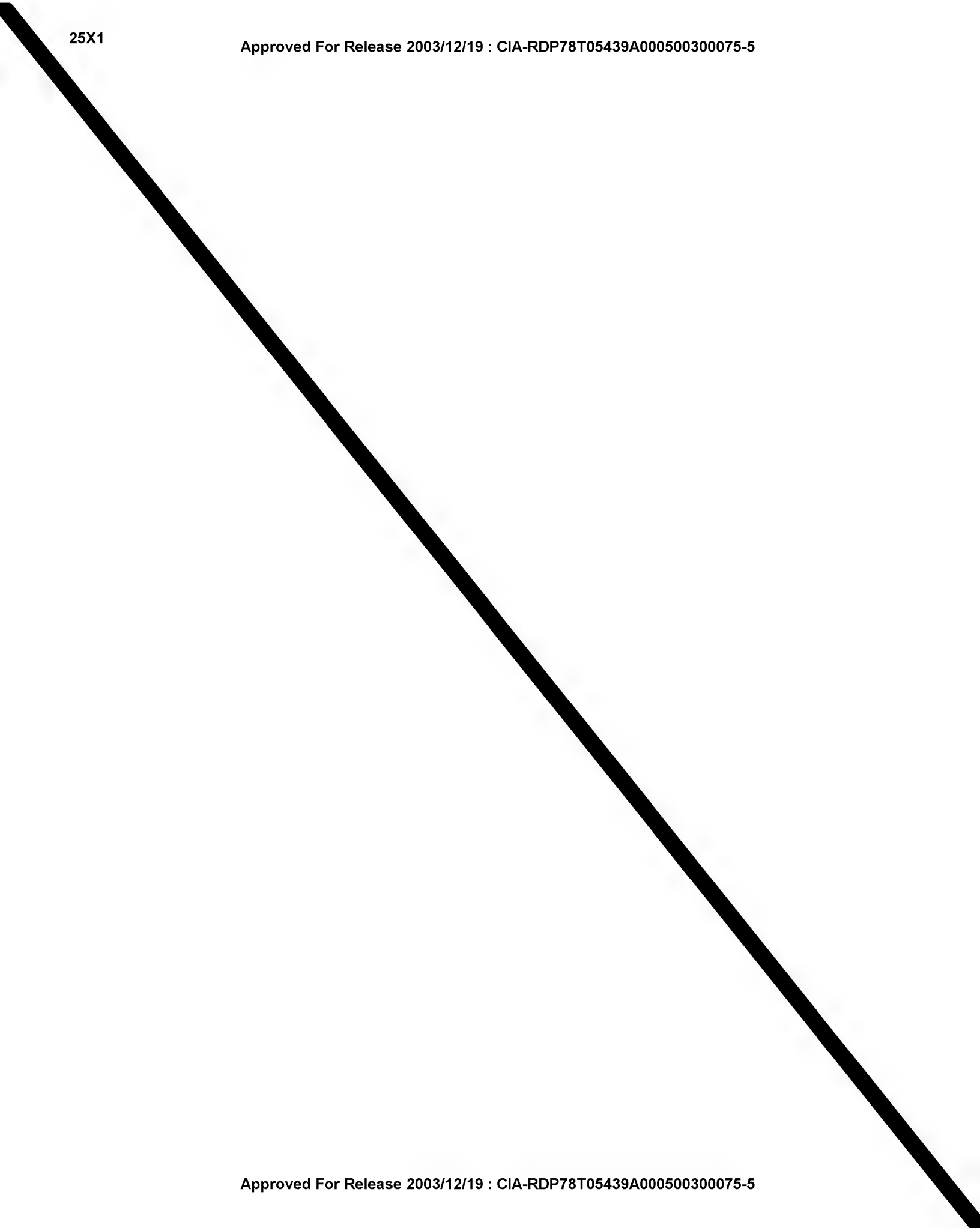
25X1A

25X1C



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